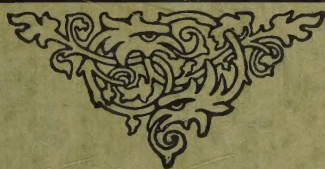


**OFFICIAL PROCEEDINGS
OF THE TWENTY-FIRST
INTERNATIONAL
IRRIGATION
CONGRESS**



Held at
CALGARY, ALBERTA, CANADA
October 5-9, 1914

DEPARTMENT OF THE INTERIOR
IRRIGATION BRANCH

OFFICIAL PROCEEDINGS
OF THE
TWENTY-FIRST
INTERNATIONAL IRRIGATION
CONGRESS

8-203
HELD AT
103

CALGARY, ALBERTA, CANADA
OCTOBER 5-9, 1914

EDITED BY ARTHUR HOOKER

Published by authority of Hon. W. J. Roche, Minister of the Interior

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1915



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OFFICERS

OF THE

Twenty-First International Irrigation Congress

RICHARD W. YOUNG.....President
Salt Lake City, Utah.

J. B. CASE.....First Vice-President
Abilene, Kansas.

JOHN FAIRWEATHER.....Second Vice-President
Fresno, California.

S. H. LEA.....Third Vice-President
Pierre, South Dakota.

RICHARD F. BURGESS.....Fourth Vice-President
El Paso, Texas.

KURT GRUNWALD.....Fifth Vice-President
Denver, Colorado.

GEORGE A. SNOW.....Chairman Executive Committee
Salt Lake City, Utah.

ARTHUR HOOKER.....Secretary
Spokane, Washington.

Board of Governors

GEO. A. SNOW, Chairman.

J. S. DENNIS.

RICHARD W. YOUNG, President.

DOUGLAS WHITE.

ARTHUR HOOKER, Secretary.

LOU D. SWEET.

L. NEWMAN.

Executive Committee

Twenty-first International Irrigation Congress.

Arizona.....	F. S. Lack.....	Phoenix
California.....	John A. Fox.....	San Diego
Colorado.....	Lou D. Sweet.....	Denver
Connecticut.....	Miss Frida Sanford.....	Derby
District of Columbia.....	C. J. Blanchard.....	Washington
Idaho.....	C. M. Hill.....	Boise
Illinois.....	D. H. Anderson.....	Chicago
Iowa.....	M. F. P. Costelloe.....	Ames
Kansas.....	R. H. Faxon.....	Wichita
Louisiana.....	Warren B. Reed.....	New Orleans
Missouri.....	F. L. Vandergrift.....	Kansas City
Nebraska.....	Prof. O. V. P. Stout.....	Lincoln
Nevada.....	James G. Givens.....	Las Vegas
New Mexico.....	Col. W. S. Hopewell.....	Albuquerque
New York.....	Truman G. Palmer.....	New York
Ohio.....	E. F. Bohm.....	Cleveland
Oklahoma.....	Harley J. Hooker.....	Tulsa
Oregon.....	J. T. Hinkle.....	Hermiston
Pennsylvania.....	Morris Knowles.....	Pittsburg
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Texas.....	J. A. Smith.....	El Paso
Washington.....	R. Insinger.....	Spokane
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Connecticut.....	Alfred A. Olds.....	Hartford
District of Columbia.....	F. H. Newell.....	Washington
Illinois.....	C. B. Schmidt.....	Chicago
Iowa.....	M. I. Evinger.....	Ames
Kansas.....	H. B. Walker.....	Manhattan
Louisiana.....	Jared Y. Sanders.....	New Orleans
Missouri.....	D. E. King.....	St. Louis
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Nevada.....	Wm. E. Abbott.....	Mesquite
New Mexico.....	W. E. Garrison.....	State College
Ohio.....	Gov. Judson Harmon.....	Columbus
Oklahoma.....	Roy Stafford.....	Oklahoma City
Oregon.....	J. N. Teal.....	Portland
Pennsylvania.....	Prof. S. B. McCormick.....	Pittsburg
South Dakota.....	J. D. Deets.....	Pierre
Texas.....	Matt Russell.....	Cotulla
Utah.....	Heber M. Wells.....	Salt Lake City
Washington.....	Dr. E. A. Bryan.....	Pullman
Alberta.....	Norman S. Rankin.....	Calgary

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Twenty-first International Irrigation Congress.

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Secretary.

Andrew Miller, Industrial Commissioner, Calgary.

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T. A. P. Frost, City Alderman.
Harold W. Riley, City Alderman.
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J. H. Woods, Managing Director The Herald.

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Geo. Harcourt, Deputy Minister of Agriculture for Alberta.
G. H. Hutton, Manager Dominion Experimental Farm at Lacombe.
Dr. G. W. Kerby, Principal Mount Royal College.
Hon. Duncan Marshall, Minister of Agriculture for Alberta.
A. F. Mantle, Deputy Minister of Agriculture for Saskatchewan.
C. P. Marker, Dairy Commissioner for Alberta.
H. B. Muckleston, Asst. Chief Engineer, Dept. of Natural Resources, C. P. R.
Norman S. Rankin, General Publicity Agt Dept. of Natural Resources, C. P. R.
Dr. J. G. Rutherford, Supt. Animal Husbandry Branch, C. P. R.

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 D. W. Hays, Chief Engineer Southern Alberta Land Co.
 Hon. W. R. Ross, Minister of Lands for British Columbia.
 G. M. Thompson, Editor News-Telegram.
 J. Bruce Walker, Dominion Commissioner of Immigration, Ottawa.
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 B. S. White, Editor The Western Standard.

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 F. H. Peters, Commissioner of Irrigation, Dept. of the Interior.
 L. P. Strong, Grain Merchant.
 J. H. Woods, Managing Director The Herald.

MEETING PLACES AND LIST OF OFFICERS

OF THE

INTERNATIONAL IRRIGATION CONGRESS — 1891-1914.

First Congress—1891.

September 15—17.

Place	Officers.
Salt Lake City, Utah.....	C. C. Wright, * California..... President
	Gov. Arthur L. Thomas, Utah..... Ch. Ex. Com.
	Wm. E. Smythe, San Diego, Cal..... Secretary

1892

No meeting of the Congress.

Second Congress—1893.

Los Angeles, Cal.....	J. S. Emery, * Lawrence, Kan..... President
	Wm. E. Smythe, San Diego, Cal.... Ch. Ex. Com.
	Fred L. Alles, Los Angeles, Cal..... Secretary

Third Congress—1894.

Denver, Col.....	Elwood Mead, Cheyenne, Wyo..... President
	Wm. E. Smythe, San Diego, Cal.... Ch. Ex. Com.
	Fred. L. Alles, Los Angeles, Cal..... Secretary

Fourth Congress—1895.

Albuquerque, N. Mex....	Geo. Q. Cannon, * Salt Lake City, Utah. President
	E. R. Moses, Great Bend, Kan..... Ch. Ex. Com.
	Fred L. Alles, Los Angeles, Cal..... Secretary

Fifth Congress—1896.

Phoenix, Ariz.....	C. B. Boothe, * Los Angeles, Cal..... President
	E. R. Moses, Great Bend, Kan..... Ch. Ex. Com.
	Jas. H. McClintock, Phoenix, Ariz..... Secretary

Sixth Congress—1897.

Lincoln, Neb.....	C. B. Boothe, * Los Angeles, Cal..... President
(No Proceedings Printed.)	E. R. Moses, Great Bend, Kan..... Ch. Ex. Com.
	F. J. Mills, Boise, Idaho..... Secretary

Seventh Congress—1898.

Cheyenne, Wyo.....	Jos. M. Carey, Cheyenne, Wyo..... President
	Jos. M. Carey, Cheyenne, Wyo.... Ch. Ex. Com.
	O. E. McCutcheon, Saginaw, Mich.... Secretary

Eighth Congress—1899.

Missoula, Mont.....	Dr. S. B. Young, Salt Lake City, Utah.. President
	C. B. Boothe, * Los Angeles, Cal.... Ch. Ex. Com.
	H. B. Maxson, Reno, Nev..... Secretary

*Deceased.

Ninth Congress—1900.**November 21—24.**

Chicago, Ill.....	Elwood Mead, Cheyenne, Wyo.....	President
	Geo. H. Maxwell, Chicago, Ill.....	Ch. Ex. Com.
	H. B. Maxson, Reno, Nev.....	Secretary

1901.

Buffalo and Colorado Springs selected. No Congress held at either place.

Tenth Congress—1902.

Colorado Springs, Col.....	Thos. F. Walsh, * Washington, D. C.....	President
	C. E. Wantland, Denver, Col.....	Ch. Ex. Com.
	H. B. Maxson, Reno, Nev.....	Secretary
	Gilbert McClury, Ch. Colorado Springs Bd. Cont.	

Eleventh Congress—1903.**September 15—18.**

Ogden, Utah.....	W. A. Clark, Butte, Mont.....	President
	Fred J. Kiesel, Ogden, Utah.....	Ch. Ex. Com.
	H. B. Maxson, Reno, Nev.....	Secretary
	L. W. Shurtliff.....	Ch. Ogden Bd. Cont.
	W. T. Beardsley.....	Sect. Ogden Bd. Cont.

Twelfth Congress—1904.

El Paso, Texas.....	W. A. Clark, Butte, Mont.....	President
	C. B. Boothe, * Los Angeles, Cal.....	Ch. Ex. Com.
	H. B. Maxson, Reno, Nev.....	Secretary
	W. W. Turney.....	Ch. El Paso Bd. Cont.
	A. W. Gifford.....	Sect. El Paso Bd. Cont.

Thirteenth Congress—1905.

Portland, Ore.....	Gov. Geo. C. Pardee, Oakland, Cal.....	President
	C. B. Boothe, * Los Angeles, Cal.....	Ch. Ex. Com.
	Tom Richardson, Portland, Ore.....	Secretary

Fourteenth Congress—1906.

Boise, Idaho.....	Gov. Geo. C. Pardee, Oakland, Cal.....	President
	Montie B. Gwinn, Boise, Idaho.....	Ch. Ex. Com.
	H. B. Maxson, Reno, Nev.....	Secretary
	John McMillan.....	Ch. Boise Bd. Cont.
	Joseph Perrault.....	Sect. Boise Bd. Cont.

Fifteenth Congress—1907.**September 2—7.**

Sacramento, Cal.....	Gov. Geo. Chamberlain, Portland Ore...	President
	W. A. Beard, Sacramento, Cal.....	Ch. Ex. Com.
	D. H. Anderson, Chicago, Ill.....	Secretary
	George W. Peltier.....	Ch. Sacramento Bd. Cont.

Sixteenth Congress—1908.**September 29—October 3.**

Albuquerque, N. Mex.....	F. C. Goudy, Denver, Col.....	President
	F. C. Goudy, Denver, Col.....	Ch. Ex. Com.
	B. A. Fowler, Phoenix, Ariz.....	Secretary
	W. S. Hopewell.....	Ch. Albuquerque Bd. Cont.
	R. E. Twitchell.....	Sect. Albuquerque Bd. Cont.

*Deceased.

Seventeenth Congress—1909.

August 9—14.

Spokane, Wash.....	Geo. E. Barstow, Barstow, Texas.....	President
	W. A. Beard, Sacramento, Cal.....	Ch. Bd. Gov.
	B. A. Fowler, Phoenix, Ariz.	Secretary
	R. Insinger.....	Ch. Spokane Bd. Cont.
	Arthur Hooker.....	Sect. Spokane Bd. Cont.

Eighteenth Congress—1910.

September 26-30.

Pueblo, Colo.....	B. A. Fowler, Phoenix, Ariz.	President
	R. Insinger, Spokane, Wash.....	Ch. Bd. Gov.
	Arthur Hooker, Spokane, Wash.....	Secretary
	P. J. Dugan.....	Ch. Pueblo Bd. Cont.
	R. H. Faxon.....	Sect. Pueblo Bd. Cont.

Nineteenth Congress—1911.

December 5—9.

Chicago, Ill.....	B. A. Fowler, Phoenix, Ariz.	President
	R. Insinger, Spokane, Wash.....	Ch. Bd. Gov.
	Arthur Hooker, Spokane, Wash.....	Secretary
	Robert R. McCormick....	Ch. Chicago Bd. Cont.
	Arthur Hooker.....	Sect. Chicago Bd. Cont.

Twentieth Congress—1912.

Salt Lake City, Utah.....	Francis G. Newlands, Reno, Nev.....	President
	R. W. Young, Salt Lake City, Utah	Ch. Ex. Com.
	Arthur Hooker, Spokane, Wash.....	Secretary
	Geo. A. Snow.....	Ch. Salt Lake City Bd. Cont.
	Joseph E. Caine....	Sect. Salt Lake City Bd. Cont.

1913

Phoenix, Arizona, selected. No meeting held.

Twenty-first Congress—1914.

Calgary, Alberta.....	R. W. Young, Salt Lake City, Utah....	President
	Geo. A. Snow, Salt Lake City, Utah	Ch. Bd. Gov.
	Arthur Hooker, Spokane, Wash.....	Secretary
	J. S. Dennis.....	Ch. Calgary Bd. Cont.
	Andrew Miller.....	Sect. Calgary Bd. Cont.

Place and Officers Selected for the Twenty-second Congress—1915.

Sacramento, Cal.....	J. B. Case, Abilene, Kansas.....	President
	L. Newman, Great Falls, Mont.....	Ch. Bd. Gov.
	Arthur Hooker, Spokane, Wash.....	Secretary
	Congress Address, Sacramento, Cal.	

OFFICIAL CALL

Twenty-First International Irrigation Congress

TO ALL THE WORLD, GREETING:

The International Irrigation Congress will hold its Twenty-first Session in Calgary, Alberta, Canada, October 5, 6, 7, 8 and 9, 1914.

The Session will open at 10.00 o'clock Monday morning, October 5.

MEETING PLACE

The City of Calgary is honoured with the first meeting of the International Irrigation Congress to be held without the borders of the United States, and it is fitting that this should be so. Calgary is the western gateway to an immense irrigation project embracing over 3,000,000 acres, which is said to be the largest project of its kind on the American continent, and the second largest in the world.

Calgary is the business centre of the province of Alberta, and the largest city between Winnipeg and Vancouver. Its location is picturesque, situated as it is in the foothills of the Rocky Mountains, and at the junction of the Bow and Elbow rivers.

Calgary is approximately 840 miles west of Winnipeg, 640 miles east of Vancouver, 200 miles north of the boundary line between Canada and the United States, and only 80 miles from Banff, "The Playground of Canada," with its beautiful hotels, its world-famed hot sulphur springs, its mountain drives and climbs. Special rates are being arranged for delegates.

The dates for the Congress have been set for a time when Calgary's climate is not only pronounced particularly delightful, but when the farmer and irrigator can most conveniently attend; and delegates and visitors are assured their visit in Calgary will be memorable.

PROGRAMME

The ablest speakers of this and other lands will discuss the vital questions of to-day in connection with irrigation and the advancement of agriculture in general.

Our water resources are our most important assets, and it is fitting they should be discussed by the International Irrigation Congress—the most important organization of its kind the world over.

The problems of the settler on the land will receive due attention. The farmer will have ample opportunity to be heard.

The technical side of irrigation—the storing of floods, the measurement of streams, the scientific investigation of irrigation projects, the putting of the water on the land—will be emphasized.

Perhaps most important of all is colonization—putting the men on the land. Nowhere have colonization methods been worked out with better results than in Canada, and nowhere can this subject be studied to better advantage. Colonization will be one of the most important topics of the programme.

The work of the Irrigation Congress for the enactment of more practical and uniform state and national irrigation laws will be continued, and other improvements advocated.

The Congress has always stood for the opportunity to build new homes—an answer to the call of the landless man for the manless land—“Make easy the path of the home-builder.”

The Irrigation Congress has accomplished much in the past; there remains more to accomplish in the future.

One day of the Congress will be devoted to a trip—free to delegates—covering a 160 mile journey through the irrigation block lying to the east of Calgary, and a visit of inspection to the Horseshoe Bend Dam near Bassano, which stores water for the largest individual irrigation project on this continent.

The Twenty-First Session of the Congress will well repay your attendance. Make your plans to attend. Free discussion is an important feature of the Congress, and will be encouraged.

EXHIBITION

An attractive feature in connection with the Calgary meeting of the Congress will be the international exhibition of agricultural and horticultural products. It is the intention to make the exhibition truly international and, side by side, it is planned to show the products of the various Provinces of Canada and the States of the Union.

FOREIGN REPRESENTATIVES

Through the Dominion Government, invitations have been extended to all foreign governments interested in irrigation to send representatives to the Congress.

In foreign lands, the interest in irrigation is increasing, and valuable information will be presented by the many foreign delegates in attendance.

The foreign representation will be an important feature of the organization.

VISITORS

The presence of visitors, including ladies, is especially appreciated, and their attendance is invited.

PERSONNEL

The personnel of the International Irrigation Congress will be as follows:—

The Officers of the Congress.

The Chief Executive of any nation.

The Vice-Chief Executive of any nation.

The Cabinet Members of any nation.

Members of the highest legislative body of any nation.

Governors of States and Provinces.

Members of Federal, Dominion, State and Provincial Irrigation, Water and Conservation Commissions.

State and Provincial Engineers and Commissioners of Agriculture and Horticulture.

The Mayor of each city or town having a population of over one thousand.

Executive Committeemen, Honorary Vice-Presidents and Members of Board of Control.

Chairmen of general and special committees.

Permanent delegates.

Delegates appointed under the provisions of the Constitution as follows:—

DELEGATES

Fifty delegates appointed by the Governor of each state, province or territory.

Ten delegates appointed by the mayor of each city of more than twenty-five thousand population.

Five delegates appointed by the mayor of each city of less than twenty-five thousand population and over one thousand.

Five delegates appointed by the chairman of the governing body of each county.

Five delegates duly accredited from each commercial body and club concerned with public interests.

Two delegates appointed by the mayor of each incorporated town having a population of less than one thousand.

Two delegates duly accredited by each regularly organized association devoted to Irrigation, Agriculture, Horticulture and Engineering.

Two delegates duly accredited from each irrigation or canal company.

Two delegates duly accredited from each College and University.

EARLY ACTION IMPORTANT

Appointment of delegates should be made as early as possible to facilitate the organization of delegations.

Notices of appointment giving full name and post office address of each delegate should be forwarded to the Secretary of the Congress at Calgary.

PERMANENT DELEGATES

While the policy of the Congress is shaped at each session by the delegations, the continuity of the organization and the efficiency of its work are influenced by the permanent delegates provided for by Article VI, Section II, of the Constitution; and members interested in the permanency of the Congress are invited to become permanent delegates.

SPECIAL RAILWAY RATES

Special railway rates and tourist's fares will be available on all important lines. Delegates should make early application for information regarding special rates.

Delegates to the Congress will see the great irrigation projects, and also have the opportunity of a journey through the Canadian Rockies and a visit to the scenic points in Canada and the Western United States.

HOTELS

Calgary has the best of hotel accommodations, including a new, modern hotel with accommodations equal to any in the country. For the convenience of delegates and visitors, an information bureau will be established.

INFORMATION

Information relative to the Congress programme, railroad and hotel rates and other data, will be furnished upon request from the office of the Secretary, Board of Trade Building, Calgary.

You are invited to join in the great constructive work of the Congress.

Calgary, Alberta, July 30, 1914.

THE INTERNATIONAL IRRIGATION CONGRESS,

By RICHARD W. YOUNG, President.

ARTHUR HOOKER, Secretary

The Board of Control, The Executive Committee,

By J. S. DENNIS, Chairman By GEO. A. SNOW, Chair'n
ANDREW MILLER, Secretary.

T E N T A T I V E
Official Program

Twenty-first International
Irrigation Congress



October 5 = 9, 1914

Calgary = Alberta = Canada

MEETINGS — REGISTRATION HEADQUARTERS — EXHIBITION
AT THE

Horse Show Building - Victoria Park

ADMISSION FREE :: PUBLIC INVITED

PROGRAMME

MONDAY MORNING, OCTOBER 5

9.00 O'CLOCK

OPENING PARADE—103rd regimental band; His Honour, the Lieutenant Governor of Alberta, with military escort; the President and Officers of the International Irrigation Congress; Officers and Members of the Board of Control; representatives of the Federal and Provincial Governments, foreign consuls; the mayor and city council; officials of the province of Alberta and city of Calgary; delegates and visitors of the Irrigation Congress, and citizens of Calgary.

The parade will form at and leave the Palliser Hotel at 9 o'clock, proceeding north on First Street West to Eighth Avenue, east on Eighth Avenue to Second Street East, and thence south on Second Street East to the Exposition Grounds.

OPENING EXERCISES at Horse Show Building, Victoria Park.
MUSIC—103rd Regimental Band.

OFFICIAL OPENING by H. R. H. The Duke of Connaught, *Governor-General of Canada*. By special arrangement, at 10.00 o'clock, the Governor-General, at Ottawa, will press a button. The resulting electric impulse travelling over the wires to Calgary will release the flags of the British Empire and the United States, following which will be read a message of greeting from the Governor-General.

MUSIC—Patriotic Airs—103rd Regimental Band.

CALL TO ORDER by J. B. Case, *Vice-Chairman International Executive Committee*.

INVOCATION—The Very Rev. Edward S. Paget, Dean of Calgary.

INTRODUCTION of J. S. Dennis, *Chairman Board of Control*.

RESPONSE by Chairman Dennis.

MUSIC—103rd Regimental Band.

INTRODUCTION of Major Richard W. Young, *President of the Congress*.

WELCOME TO CANADA by His Honour, G. H. V. Bulyea, *Lieutenant-Governor of Alberta*.

WELCOME TO THE PROVINCE by Hon. A. L. Sifton, *Premier of Alberta*.

WELCOME TO CALGARY by His Worship, H. A. Sinnott, *Mayor of Calgary.*

SOLO—"There's a Land" *Allitsen*
MR. J. E. WILLIAMS.

RESPONSE ON BEHALF OF THE CONGRESS by President Young.

SOLO—"The Song of the Motherland" *Miller*
MISS ZELIE DELSART.

REPORT OF THE EXECUTIVE COMMITTEE.

ADOPTION OF RULES FOR THE CONGRESS.

ANNOUNCEMENT CONCERNING COMMITTEES, instructions to delegations concerning appointments to be made by them.

MONDAY AFTERNOON, OCTOBER 5

2.30 O'CLOCK.

"NATION BUILDING IN WESTERN CANADA," J. Bruce Walker (Winnipeg), *Dominion Commissioner of Immigration.*

DISCUSSION.

SOLO—"Come Beloved" *Handel*
MISS IRIS HARRISON

"THE LANDLESS MAN AND THE MANLESS LAND," J. B. Case (Kansas), *First Vice-President, International Irrigation Congress; Past President Trans-Mississippi Commercial Congress.*

DISCUSSION.

"FAILURE OF IRRIGATION AND LAND SETTLEMENT POLICIES OF THE WESTERN STATES," D. W. Ross (California), *Consulting Engineer.*

DISCUSSION.

MONDAY EVENING, OCTOBER 5

8.00 O'CLOCK

MUSIC—"God Save the King."

"The Star-Spangled Banner."

"La Brabanconne" (Belgium Anthem) arranged by
Max Weil.

"O, Canada!"

IRRIGATION CONGRESS CHORUS, *Max Weil, Conductor.*

GREETING FROM THE UNITED STATES DEPARTMENT OF THE INTERIOR, conveyed by F. H. Newell, *Director United States Reclamation Service.*

MUSIC—British Patriotic Airs. . . . *Irrigation Congress Chorus*

ADDRESS—Hon. Duncan Marshall, *Minister of Agriculture for Alberta; President Western Canada Irrigation Association.*

MUSIC—"Land of Hope and Glory" *Elgar*
IRRIGATION CONGRESS CHORUS.
Soloist—MISS ZELIE DELSART.

"STORAGE AND POWER POSSIBILITIES OF THE BOW RIVER,
WEST OF CALGARY" (Illustrated with Stereoptican Views),
M. C. Hendry (Winnipeg), *Engineer of Dominion Water*
Power Branch.

TUESDAY MORNING, OCTOBER 6

9.30 O'CLOCK

"THE DOMINION GOVERNMENT LAWS RESPECTING IRRIGA-
TION IN WESTERN CANADA," F. H. Peters (Alberta),
Dominion Irrigation Commissioner.

DISCUSSION.

ADDRESS—L. A. Nares (California).

DISCUSSION.

ADDRESS—Hon. W. R. Ross (British Columbia), *Minister of*
Lands, Province of British Columbia.

DISCUSSION.

TUESDAY AFTERNOON, OCTOBER 6

2.30 O'CLOCK

ADDRESS—Hon. J. A. Lougheed, Senator (Alberta), *Member*
Dominion Government.

"THE IRRIGATION DISTRICT," J. T. Hinkle (Oregon), *Former*
Secretary Oregon Irrigation Congress.

DISCUSSION.

"THE NECESSITY OF A HIGHER DUTY OF WATER," C. C.
Thom, *Soil and Irrigation Specialist, The State College of*
Washington.

DISCUSSION.

TUESDAY EVENING, OCTOBER 6

9.00 O'CLOCK

RECEPTION at the Palliser Hotel, by His Honour, G. H. V. Bulyea, Lieutenant-Governor of Alberta, to delegates, speakers, officers and friends of the International Irrigation Congress including the citizens of Calgary.

The reception is planned both as a formal opportunity for visitors to and citizens of Calgary to meet His Honour, the Lieutenant-Governor of Alberta, and also to afford an informal meeting at which visitors to the city and the residents of Calgary may make themselves acquainted under more favourable social conditions than are afforded at the business meetings of the Congress.

Evening dress will be in order, although not a requirement.

WEDNESDAY MORNING, OCTOBER 7

9.30 O'CLOCK

"FARM DEVELOPMENT IN THE ARID WEST," Kurt Grunwald (Colorado), *Consulting Agriculturist; Fifth Vice-President International Irrigation Congress; Director San Luis Valley Drainage Association.*

DISCUSSION.

"WATER ADMINISTRATION IN BRITISH COLUMBIA," William Young (British Columbia), *Comptroller Water Rights, Province of British Columbia.*

DISCUSSION.

"RECENT IRRIGATION DISTRICT LEGISLATION IN CALIFORNIA," A. L. Cowell, *Field Secretary for California, Panama-Pacific International Exposition.*

DISCUSSION.

"THE RELATION OF THE FARMER TO THE IRRIGATION PROJECT," D. W. Hays (Alberta), *Chief Engineer Southern Alberta Land Company.*

DISCUSSION

WEDNESDAY AFTERNOON, OCTOBER 7

2.30 O'CLOCK

"IRRIGATION IN ALBERTA AND THE SETTLER ON IRRIGATED LAND," Robert S. Stockton (Alberta), *Superintendent, Operations and Maintenance, Department of Natural Resources, Canadian Pacific Railway Company.*

DISCUSSION.

"SOME IRRIGATION PROBLEMS IN TEXAS," J. C. Nagle, *Chairman Board of Water Engineers, State of Texas.*

DISCUSSION.

"IRRIGATION AND SASKATCHEWAN AGRICULTURE," A. F. Mantle, *Deputy Minister of Agriculture for Saskatchewan.*

DISCUSSION.

ADDRESS—Niel Nielsen, *Commissioner of Trade and Irrigation from Australia to the United States and Canada.*

WEDNESDAY EVENING, OCTOBER 7

8.00 O'CLOCK

MUSIC—"God Save the King."
"La Marseillaise,"
Russian National Anthem,
"The Maple Leaf Forever."

IRRIGATION CONGRESS CHORUS, *Max Weil, Conductor.*

"IRRIGATION ENTERPRISES OF THE CANADIAN PACIFIC RAILWAY COMPANY IN ALBERTA," H. B. Muckleston (Alberta), *Assistant Chief Engineer, Department of Natural Resources, Canadian Pacific Railway Company.*

DISCUSSION.

MUSIC—Patriotic Songs of the Empire.

IRRIGATION CONGRESS CHORUS.

Soloist—MR. HORACE REYNOLDS.

"WATER STORAGE AND DISTRIBUTION BY THE UNITED STATES RECLAMATION SERVICE," (Illustrated with stereoptican views), F. H. Newell (Washington, D. C.), *Director United States Reclamation Service.*

THURSDAY MORNING, OCTOBER 8

9.30 O'CLOCK

ADDRESS—Dr. J. G. Rutherford (Alberta), *Superintendent Animal Husbandry, Canadian Pacific Railway.*

DISCUSSION.

"THE GREAT FALLS PLAN OF CO-OPERATION BETWEEN THE CITY AND FARMING COMMUNITY," L. Newman (Montana), *Board of Governors, International Irrigation Congress.*

DISCUSSION.

"SILT PROBLEMS OF THE COLORADO RIVER," F. C. Finkle (California), *Consulting Engineer.*

DISCUSSION.

"IRRIGATION CONDITIONS IN THE STATE OF WASHINGTON," E. F. Benson, *President Washington Irrigation Institute.*

DISCUSSION.

THURSDAY AFTERNOON, OCTOBER 8

2.30 O'CLOCK

REPORT OF RESOLUTIONS COMMITTEE.

DISCUSSIONS OF RESOLUTIONS.

CALL OF STATES AND PROVINCES—*Five Minute Talks by Representatives of State Delegations.*

THURSDAY EVENING, OCTOBER 8,

8.00 O'CLOCK

MUSIC—"God Save the King."

"O, Canada!

National Anthems of the Allies—

Belgium.

Russia.

France.

IRRIGATION CONGRESS CHORUS, *Max Weil, Conductor.*

IRRIGATION PICTURES, SHOWN WITH STEREOPTICON VIEWS,
H. N. Savage, *Supervising Engineer United States Reclamation Service.*

ADOPTION OF RESOLUTIONS.

MUSIC—"Rule Britannia."

"Hearts of Oak."

"The Minstrel Boy."

"Scots Wha' Hae."

"March of the Men of Harlech."

"Land of Hope and Glory"..... *Elgar*

IRRIGATION CONGRESS CHORUS.

Soloists—MISS ZELIE DELSART.

MR. HORACE REYNOLDS.

Accompanist—MR. PERCY HOOK.

The piano used is a Gerhard Heintzman.

REPORT OF COMMITTEE ON PERMANENT ORGANIZATION.

SELECTION OF NEXT PLACE OF MEETING.

ELECTION OF OFFICERS.

ADJOURNMENT SINE DIE.

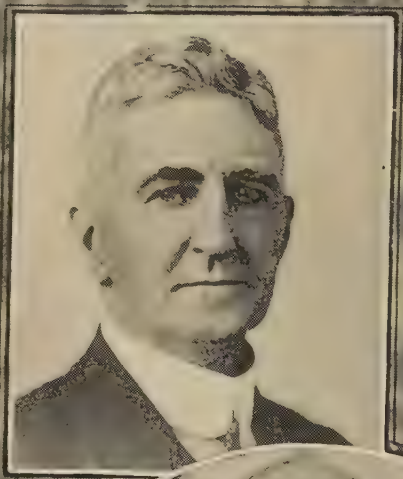
FRIDAY, OCTOBER 9

10.00 O'CLOCK

EXCURSION to the great irrigation project of the Canadian Pacific Railway east of Calgary Through the courtesy of the Canadian Pacific Railway the excursion is free to delegates.

Special train leaves C. P. R. depot ten o'clock Friday morning, arriving at Bassano 12.45 o'clock. After cold luncheon provided by the town of Bassano, delegates will be carried by automobiles to inspect the Horseshoe Bend Dam. Train returning leaves Bassano 4.30 p. m., arriving at Calgary 7 p. m.

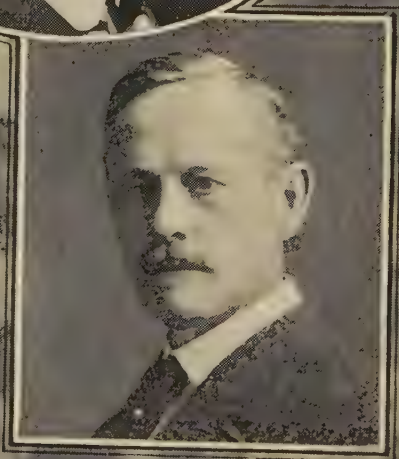
Delegates desiring to go must hand their names to, and receive, Railroad ticket, from Andrew Miller, Secretary Board of Control, or Norman Rankin, Chairman Publicity Committee, before noon Thursday.



J. B. CASE,
President.



J. B. DENNIS
1st Vice-President.



MAJOR RICHARD W. YOUNG,
President.

OFFICIAL PROCEEDINGS
OF THE
**Twenty-First
International Irrigation Congress**

HELD AT
CALGARY, ALBERTA
October 5-9, 1914

OPENING SESSION

MONDAY, OCTOBER 10, 1914
HORSE SHOW BUILDING, VICTORIA PARK
10 o'clock a. m.

The opening session of the Twenty-first International Irrigation Congress convened a few minutes before 10.00 o'clock, Monday morning, October 5, 1914, in the Horse Show Building, Victoria Park, Calgary, Alberta, Canada. A stenographic report of the proceedings follows.

OPENING CEREMONY

MR. J. S. DENNIS, chairman of the Board of Control:

Ladies and Gentlemen: I am asked to explain to you the opening ceremony. Behind these flags is a large picture of His Royal Highness, the Governor General. The strings attached to the side of the flags go to a small motor at the back of the building which is connected by a direct circuit over the telegraph wires to the Government House at Ottawa. At exactly twelve o'clock Ottawa time—ten o'clock here—His Royal Highness, inserting the key at Government House, sends the necessary current across the wires here, raising the flags and leaving his picture exposed to us. The band will then play "God Save The King" and His Honour, the Lieutenant-Governor, will follow, delivering His Royal Highness' message to the Congress, and declaring it opened. We will therefore ask you to compose yourselves in patience quietly

for a short while, when we expect that automatically those flags will be drawn back. (Applause)

Promptly at 10 o'clock the electric impulse from Ottawa started the motor, and as the draped flags were drawn back; with the audience standing the 103d Regimental Band played "God Save The King" (Applause).

CHAIRMAN DENNIS: I will now ask His Honour, the Lieutenant Governor, Ladies and Gentlemen, to convey to you a few words of greeting from His Royal Highness, the Governor General, on the opening of this, the 21st International Irrigation Congress. (Applause).

Greetings from
The Governor-General
at Ottawa

HIS HONOUR, G. H. V. BULYEA, Lieutenant Governor of Alberta: Mr. Chairman, Ladies and Gentlemen:

I am commanded by His Royal Highness to convey to the officers and members of this association, his appreciation of the fact that by your courtesy you enabled him to be officially connected with the opening of this Congress. His Royal Highness would have been pleased to have been here to-day to show by his presence the interest he takes in the development of our country and in irrigation, as a means of that development, but as you will all know, on account of the serious European disturbances at present, he is unable to leave the seat of government.

During his visit here a few months ago, he showed by his inquiry into the condition of all of the people of this western country, coming from the many different points of the world, his personal interest in their welfare. He commands me to say that nothing whatever could give him greater pleasure than to have been here to-day because he thinks that by means of irrigation, and by means of the intensified system of farming which is possible under irrigation, homes can be built for an immense number of people on these lands, and on certain sections of the land where the ordinary methods of cultivation are not possible. He has followed the reports of your similar meetings, and wishes me to say that he hopes that your meeting here in the city of Calgary to-day will be of the same class and the addresses that will be delivered will be of the same utility as similar addresses have been at previous meetings.

He is particularly glad to welcome those delegates who come from south of the line, because he realizes that the

development of Canada is linked up to a great extent with the development of our friends to the south, and whatever is of benefit to the one is of benefit to the other, and he is particularly glad to see that you are working heartily together to carry out the best methods of developing homes for the many in the great prairies of North America. He bids me welcome the American delegates who are here to-day, and to extend to them on his behalf the freedom of the city of Calgary, and of the Dominion of Canada, as a whole, and wishes that they will enjoy these privileges to the fullest possible extent. I regret personally very much that His Royal Highness is unable to be here, because I know a great many of you have not had the pleasure of meeting him, and you would have enjoyed that personal contact with the representative of His Majesty in Canada, and would realize that he has the welfare of all the people at heart.

A telegram has been received from His Royal Highness, as follows:

"Ottawa, Ont., Oct. 5, 1914,

"The Lieutenant Governor,
Calgary, Alberta.

"I wish the Twenty-first International Irrigation Congress a very successful meeting. Knowing its importance I hope it may produce the best result.

(Signed)

ARTHUR."

On his behalf, I wish again to extend to all the delegates his best wishes for the success of this meeting here to-day. (Applause).

CHAIRMAN DENNIS, Your Honour, Ladies and Gentlemen: I have now much pleasure in asking Director F. H. Newell, of the Reclamation Service of the United States, to say a few words to you, conveying a message from Washington on the occasion of the opening of the Congress. (Applause).



HON. A. L. SIFTON



HIS HONOR GEORGE H. V. BULYEA



HON. DUNCAN MACPHEIL

Greetings from
The President

at Washington

MR. F. H. NEWELL, Director U. S. Reclamation Service: Mr. Chairman, Ladies and Gentlemen of the Congress: On behalf of the Department of the Interior in Washington, I am authorized to extend to you the warmest appreciation of the invitation to attend this meeting. To our Canadian cousins I can express the most sincere interest in all of the arts tending to promote the peaceful development of the resources of our country and to our friends and brothers who have come from the United States, the assurance that the Washington administration has as great, if not greater, appreciation of the success of the efforts of this Congress than in former years.

We from the United States hope and expect to learn from our visit here to Canada many things which we can take back with us to aid in solving the problems which are similar on our side of the line—that invisible line which divides us politically, but which does not separate the problems which we have, namely those of internal development, of getting the right man on the ground, and getting that man to be successful in utilizing the resources Nature has bestowed on this land. It is hoped and expected that we will have an enjoyable and instructive meeting in spite of the drawbacks in the weather.

At the request of Major Young, I am pleased to announce the receipt of a message from the President of the United States. The message follows:—

The Whitehouse, Washington,
October 5, 1914

Richard W. Young, President,
International Irrigation Congress,
Calgary, Alberta.

I am pleased to send greetings to your Congress and I trust that out of your deliberations may come much that is helpful to that section of our continent which needs the irrigation of its lands to make it fertile. I am much interested in the effort made to reclaim the arid lands of the United States and I hope to see such enterprise greatly extended within the next few years.

(Signed) WOODROW WILSON.

Again on behalf of the Washington administration I wish to thank you for the opportunity of coming here and being with you at this meeting. (Applause).

SELECTION BY THE BAND: "The Maple Leaf Forever." (Applause).

CHAIRMAN DENNIS, Ladies and Gentlemen: I have now very much pleasure in introducing to you, Mr. J. B. Case, Vice-President of the Congress, who will call the meeting to order. (Applause).

CALL TO ORDER

VICE-PRESIDENT CASE: Members of the International Irrigation Congress, Ladies and Gentlemen: It is my pleasure as acting chairman of the Executive Committee of the Congress, to call together the 21st Session of the International Irrigation Congress. I might state that this is the first time in the history of the organization that it has been held outside of the United States, and we citizens of the United States are very proud to be here with you, and to hold the Congress in Canada. (Applause.)

You will please rise and hear the invocation by the Very Reverend Edward S. Paget, Dean of Calgary.

Invocation by

The Very Rev. Edward S. Paget

Dean of Calgary

Let us Pray.

Almighty God, who has put man into the Garden of the World to dress it and to keep it, bless, we pray Thee, the proceedings and the deliberations of this Congress for the reclamation of the waste places, so that the desert may rejoice and blossom as the rose. It is Thy will, O Lord, that this earth shall bring forth grass for the cattle and green herbs and grains for the service of man. May it please Thee to lighten and to prosper every effort that is made to lead the life-giving waters into the barren places, so that the whole face of the earth may use her increase to the honour and glory of Thy Holy Name. Amen, through Jesus Christ, our Lord.

CHAIRMAN CASE: It becomes my pleasure to introduce the gentleman who so kindly introduced me,—the Chairman of your Board of Control. You undoubtedly are as well acquainted with the Chairman as I am, and perhaps better, but from our very pleasant acquaintance, I will venture to say that the United States would be very glad to enlist your Chairman as one of them. Bringing with him the ideas and the promotions and the new and great showings that you have made in Western Canada, he would be extremely welcome. I now have the pleasure to present to you—not introduce to you—Mr. Dennis. (Applause.)



RUFUS C. BURDETTE



S. J. MCKEE



J. T. HINKLE



RICHARD F. BURGESS



JOHN FAIRWEATHER



GEO. ALBERT SMITH



J. A. DENNIS



J. B. CASE

Report by

J. S. Dennis

Chairman Board of Control

Your Honour, Mr. Chairman, Ladies and Gentlemen:

It is always a gratification to find even a partial fruition of our hopes. Speaking for the local Board of Control, of which I have the honour to be Chairman, I may say that we have been immensely interested in trying to make the first meeting of the International Irrigation Congress in Canada a success. We had two objects in view. We first wanted to contribute some small part to the great work that this Congress has been doing south of the international boundary. For twenty-three years—although this is only the 21st meeting—this Congress has been assembling from year to year for the purpose of endeavouring to devise ways and means of creating homes. There is no greater work that any organization anywhere could be engaged in. South of the international boundary, resulting from the work started by the Congress years ago, vast irrigation projects have sprung up, private, corporate, and those being dealt with by the Government of the United States, with the object of reclaiming waste areas. We hope that the meeting of the Congress in Calgary will further this object, not only as far as it relates to territory south of the line but also in encouraging the work we are attempting to do this side of the boundary.

We had a second object in view. This being the first time that the International Irrigation Congress has ever met outside of the United States, and we being honoured by having that first meeting in Calgary, we were particularly anxious that we should make it a success as a meeting. Unfortunately the weather clerk has disarranged our arrangements to a slight extent, but it will have this effect, that while we claim, and claim properly, that the sun shines in Alberta possibly as much and a great deal more than it does in a great many other places, our visitors from south of the line will be able to go back and say, "The weather was cold, but the greeting was warm," and we hope before you leave that you will be able to have actual experience of the sunny southern Alberta sun of which we are so proud.

The city of Calgary, beginning at home, aided by the Dominion Government, our own Provincial Government, and the Governments of our sister provinces—to the West, British Columbia, and to the East, Saskatchewan—with some assistance from the Canadian Pacific Railway, and other interests, have been able to arrange for this Congress on the basis of not only having what we hope will be an instructive

and good meeting, but also in the way of an Exhibition, and I want to ask everyone present to take the opportunity before going away, of seeing the Exhibition that we have arranged in connection with the Congress. You will find that it is probably the best exhibition of agricultural and horticultural products we have ever seen in Calgary. The Board of Control, feeling that it would add much to the meetings of the Congress to have actual exhibits of what we can produce, have given \$5,000.00 in prizes to this Exhibition. We ask you to see it and tell your friends of it so that the largest number of people possible in the city and district, will be able to take advantage of this Exhibition.

As Doctor Newell has said to you, the questions which have been discussed at previous meetings of the Congress and which will be discussed here, are of vital importance to the whole of Western America. You will see that we have been able to arrange for addresses from a large number of distinguished men who are experts in the different subjects with which they are going to deal. We hope that the largest possible number of people will attend the sessions. They are all open to the public. It is true that only accredited delegates can vote, but the public are invited to be present at all the meetings. To enliven the somewhat dry proceedings of speeches and papers, we have arranged for some music. In the afternoon we have vocalists and music, and in the evening we have something which Calgary will be proud of. We have organized a choir of four hundred voices which will sing at the evening session, under the conductorship of Max Weil.

I have nothing more to say except that I want to take this opportunity of publicly expressing my thanks to the members of the Board of Control for so loyally supporting me in attempting to make the Congress a success. We are going to be able to carry it out and to pay the whole of the expenses, including the \$5,000.00 for the Exhibits, without being in debt when we get through.

To the members of the Board of Control a great deal is owing. There has been a lot of detail work to do, and they have all loyally helped out, and all that I can say in conclusion is that with the support of the people of Calgary and the assistance of the large number of delegates who have come from south of the line and elsewhere to support us, our Congress will be a success. (Applause)

Now, Ladies and Gentlemen, it is my very pleasant privilege to present to you Major Young, the President of the Congress, who will preside during its sessions. (Applause).

Introduction of
Major Richard W. Young
President of the Congress

Your Honour, Mr. Dennis, Ladies and Gentlemen: I am appreciative of this introduction, but shall not at this moment detain you by any remarks. It seems that those who have prepared the programme have provided that what I have to say shall come just a little later in this morning's session.

Under the programme it becomes my pleasure and distinguished honour to introduce to this assembly a gentleman who needs no introduction to you, your very distinguished Lieutenant Governor, who through his own record of work, and who through the appointment by His Royal Highness, is the Lieutenant Governor of this splendid province. I introduce to you his Honour, G. H. V. Bulyea, Lieutenant Governor of the province of Alberta, who is upon the programme to welcome us to Canada. (Applause)

Address by
His Honour G. H. V. Bulyea
Lieutenant-Governor of Alberta

WELCOME TO CANADA

Mr. Chairman and Gentlemen: I do not know that I can say much more in regard to welcoming you to Canada than has already been said on behalf of His Royal Highness, who is primarily the man who should welcome you to Canada. However, I can say that I endorse his welcome in every possible way. I do not know that it is necessary for me to say anything more just at present. We all know the value of these meetings, the value of the addresses that are given by men who make a special study of the work of irrigation. We all know their value to the farmers of the country and the appreciation in which the printed reports of the meetings are held by the settlers and agriculturists who are not privileged to be present at your meetings, but who get in that way the benefit of your deliberations.

I may say that it was my duty to extend officially a number of invitations to gentlemen holding positions similar to my own, both in Canada and on the other side of the line, and we had hoped to have had a number of them present here with us to-day, but I regret that on the other side of the line this seems to be their busy season, I believe, and some of their gentlemen had work to do which was even more important

to them than an irrigation congress, and while they all expressed appreciation of the invitation they all regretted that they were unable to be present with us here to-day.

Governor Brown of Saskatchewan expected until almost the last moment that he would have been here to-day, but this telegram has just been placed in my hand, and I wish to read it for the benefit of the delegates here.

“Regina, Sask.,
Oct. 3, 1914.

“Chairman International Irrigation Congress:

“I greatly regret that through unforeseen circumstances, it will not be possible for me to be present at the opening of your Congress. With best wishes for a successful meeting,

G. W. BROWN,
Lieutenant Governor of Saskatchewan.”

Personally I extend to the delegates here a very hearty welcome, and I can endorse what Mr. Dennis has said, that I believe you will have such a hearty welcome from the people of Alberta, and particularly from the people of Calgary, that you will forget that Providence has not sent us the exact kind of weather that you would have appreciated at a meeting of this kind. However, I think that I might prophesy a little, and I believe that before the deliberations of this Congress are concluded, Sunny Alberta will excel herself, and that you will be able to go back and say that you have experienced the sunshine of Alberta as well as our more rigid atmosphere.

I am in rather a peculiar position here to-day, representing as I do, officially, His Royal Highness, and having present here the Premier of Alberta, who is supposed to put in my mouth, the words that I should say. I notice that he is also down to extend a hearty welcome, and I am going to take the opportunity of having him say his own words of welcome both for himself and for the Lieutenant Governor of Alberta.

I am sure that you will have a successful meeting. It was my privilege to attend a similar meeting in the city of Spokane several years ago, and I know that I carry yet remembrances of the very pleasant meeting spent there, and I also treasure very heartily the official report and the public papers that were presented at that meeting. I am sure that this will be equally successful and very beneficial to the agriculturists, not only on this side of the line, but those who are engaged in similar pursuits to the south of us. (Applause).

PRESIDENT YOUNG: It is now my pleasure to introduce to you the official head of the Government of the province of Alberta, The Honourable A. L. Sifton. (Applause).

Address by

Hon. A. L. Sifton

Premier of Alberta

WELCOME TO THE PROVINCE

Your Honour, Mr. President, Ladies and Gentlemen, and delegates to the International Irrigation Congress:

It is with great pleasure this morning that I have the privilege of being here for the purpose of welcoming this Congress to the province of Alberta. I believe that for more than twenty-one years this Irrigation Congress has been engaged in the very important work of endeavouring to raise crops on land which otherwise would not be fit for cultivation. It has been the work of a great many people, people who have been scattered to the uttermost parts of the earth. You are to-day without the assistance of a great many, who, in previous years have been privileged to be with you, and from whom you have received assistance in regard to irrigation matters as they have been carried on for many hundreds of years in the Eastern countries.

Circumstances have occurred that have practically confined this International Convention on this occasion, for the first time, to the people of the North American continent, and the people of this continent have in a great measure to be thankful that, although the world practically is at war at the present time, that they have been able to carry on their ordinary affairs of business, and to hold their Convention without the interference of the countries which which they are at war. Those who previously have been here have our sympathy on this occasion, and we will hope that when the present unforeseen circumstances are over, that they will again unite in this International Conference, and give us the benefit of their assistance and experience in the great irrigation work which has been carried on in other portions of the world. Notwithstanding that, it is the duty of this conference to go on, in the interests of the people of this continent, with a work which is so very important, and there is one thing which is to be considered in regard to that, and it is that the work on this continent is carried on under different circumstances from the warmer countries where irrigation has been carried on in the past.

We have on these broad prairies, and those to the immediate south of us, in the States of the Union, where irrigation is being carried on, a condition that has not been used for irrigation purposes, and it is only within the last few years that people have considered that it was possible and financially profitable to irrigate lands that do not grow expensive crops. It is easy enough to spend large quantities of money in California, in India and Egypt, for the purpose of raising immense crops of food and fruit, which are sold at big prices. It is an entirely different question to go into the countries where winters are fairly cold, as they are in the central portion of this North American continent, and by irrigation raise crops to compete with the markets of the world; consequently, we have an entirely different proposition in this country than we have in the warmer countries. The growing of fruit and such crops cannot be done in competition with these other countries, but what can be done and what has been done in many parts of this country, is, to raise immense crops of green feed for the dairy stock of the country, and for the purpose of feeding and fattening stock, and it is for these questions that this Congress meets, to develop this portion of the continent of North America, and to make it one that will support many millions of people.

I think, Mr. Chairman, that I am perhaps going into the work that will be much better done by those who have the experience of it. My only duty, according to the programme, was to welcome you to the province of Alberta. I do that most heartily, and I do it because you are engaged in a work that is of importance to the world at large. I do it also, and more particularly so, because you are engaged in work of vast importance to this southern portion of Alberta. Something has been said in regard to the weather this morning. Some of the speakers endeavoured to lay a little blame on Providence in regard to what has happened this morning. It may be possible that there would have been more people here this morning for the purpose of listening to the addresses, if the weather had been somewhat different. Although Providence can take care of itself in regard to these matters, I feel it a duty to say that in a great portion of this province, this snowstorm is a God-send to the people of this country. (Applause).

The people of the southern portion of this country had to stop ploughing last week because it was too dry to do the work that was necessary for the purpose of raising crops for next year, and this storm will place them in a better position financially, and every other way, than if we enjoyed the sunshine to which we have been too much accustomed this summer. We could have afforded to trade off a little of the sunshine on various occasions for a snowstorm of this kind.

Therefore, I think we may be thankful for this as well as all the other blessings which we have, and in welcoming you to the province of Alberta, I want it distinctly understood that not only on this occasion, but on every other occasion, Providence has been good to the province of Alberta. (Applause).

PRESIDENT YOUNG: Your Honour, Ladies and Gentlemen: It is now my pleasure to introduce to this assembly, his Worship, the Mayor of Calgary, the splendid city whose immediate guests we are. (Applause).

Address by

His Worship, H. A. Sinnott

Mayor of Calgary

WELCOME TO THE CITY

Your Honour, Mr. President, Ladies and Gentlemen:

There has been a number of changes in Chairmen of the meeting during the hour or more we have been here, and I thought when it might come to my turn to make a speech, that I would be able to introduce my successor, instead of making that speech.

I am pleased to have the opportunity of meeting you, and pleased to have the opportunity of welcoming the guests from across the line on this occasion, when a great part of the world is at war, to meet in peace here. I am pleased to have the opportunity of welcoming you to—on such an important occasion as this—the first great Congress of this nature which has met within the boundaries of the Dominion of Canada. It is only a few years since there was not very much work done on this North American continent regarding irrigation. It cannot be classed in the same category as old countries such as Egypt, where the British Government has made a fertile country from what was a desert, but I am sure that in this country, where, although we can grow magnificent crops, we have certain areas which would be better with a little more moisture, we are pleased to welcome in our midst those who have taken such a great interest and have such wide knowledge of this particular work.

I am sure in speaking this morning, that I should say a word in praise of the gentleman who has done so much in organizing this convention, Mr. Dennis, and for the work that the Canadian Pacific Railway, through him, has done, in turning lands in this province, which were apparently useless into areas which I believe in a few years will become the most

fertile within the boundaries of Alberta, but to him we owe the most in this regard for having done so much towards the organization of this convention. I do not intend to say very much this morning, especially about irrigation, because all I know about it is how to use the hose on my garden, and perhaps I don't know too much about that; so I will close by extending a most hearty welcome to those who have come to this city to be our guests on this occasion.

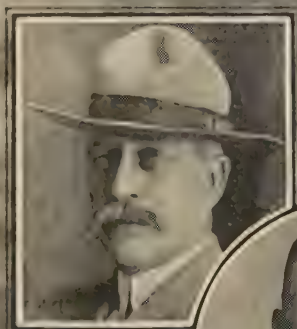
If there is anything that I can do or those in authority can do, to make your stay in our city a pleasant one, we shall be only too glad to be at your services. I remember one delegation that came here from across the line, to whom it was my duty to extend a welcome, and at the same time presented them with a key of the city. One of them, a gentleman from Saint Paul, asked me if that key would open the door of the hotel late at night. I told him that there was no such key in the city, but I can extend to you the freedom of this city on this occasion within limits and hope you will enjoy your stay in our midst. (Applause).



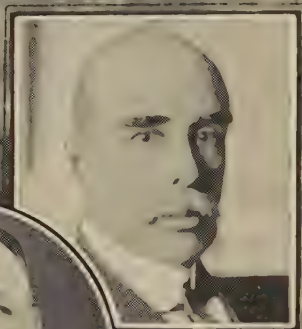
ARTHUR HOOKER



LOUIS SAFFET



EUGENE C. WHITE



J. S. DENNIS



Geo. A. SNOW
CH. FINCH



RICHARD W. KING



L. NEWMAN

BOARD OF GOVERNORS OF THE 21ST CONGRESS

Following the addresses of welcome, President Young responded as follows:

Response by

Major Richard W. Young

President International Irrigation Congress

Your Honour, Mr. Mayor, Ladies and Gentlemen: The very pleasant duty devolves upon me now to respond on behalf of the Congress to the speeches of welcome which have been made by the distinguished citizens of the Dominion, and speaking for the 21st International Congress, now holding its first session on foreign soil, I may say that we are universally and deeply appreciative of the warmth and sincerity of these welcomes. We have very much in common, we of the United States, with you good people of Canada. We speak the same language and we have the same history very largely; the same governmental aspirations, practically, and the same conceptions of human liberty; and we are bound and tied to you in an infinite number of ways, by consanguinity and affinity. I find a great number of Canadian Americans in the United States. My wife's ancestry was from the Dominion, and I find there are a great number of United States citizens here, and the line between us in an invisible line, we have so much in common. We do feel that the somewhat chilly temperature is very largely moderated by the warmth of the welcome which we have on every hand. (Applause).

We are filled with admiration for your city here, which has shown such substantial growth within the few years of its life, and which promises so much, and I cannot refrain from stating the general agreement of everyone whom I have heard express themselves on the subject as to the splendid work done by Mr. Dennis and your local Board of Control. In my experience of these Congresses, I have not seen more thorough, more intelligent preparations made for the conduct of a Congress than are evidenced on every hand here. (Applause).

A few evenings ago, I was reading the old familiar classic "Alladin" to my two small sons, one of whom was suffering from a complaint peculiar to these modern days—an unsought encounter with an automobile—and as we proceeded, we read of the building of the palace in a single night and then of its removal on the twinkling of an eye into darkest Africa, all, and much more, brought about by the mere rubbing of the wonderful lamp; whereupon the elder of the two boys exclaimed in current, if not elegant English; "That was sure some lamp."

I am reminded of this instance when I gaze on the marvels of Calgary and of the Canadian Northwest, the creations of a

single night, and I wonder by what magic this miracle has been wrought. The wondrous eastern story here repeats itself. Surely it is the work of the ancient lamp of intelligence fed by the oil of unyielding pluck, in the hands of you, the Alladins of Western Canada—the builders of palaces and the diggers of gardens more wonderful than flights of Persian imagination. I speak for all of the alien members of the Congress when I assure you that it is with the utmost satisfaction and pleasure that we are here to partake of your considerate and unbounded hospitality; and for them, and myself, I extend to you congratulations on the munificence, amounting almost to recklessness, with which you have staged this Congress, and on the intelligence with which you have provided a programme for our enlightenment and deliberations.

It is a great compliment to you of Alberta and the Canadian Northwest that there was considerable criticism of the action of the Board of Governors of the Congress in selecting Calgary for our place of meeting. It was objected that your soils were so productive, your laws so broad and just, and the opportunities offered by you to the home-seeker, so generous and helpful that it would never do for us of the United States, to assist in making your attractions more widely known among our own citizens. Our crime seemed to come under the head of treason as defined in the Constitution of the United States, namely, lending aid and comfort to the agricultural enemy, but we of the Board of Governors, to whom the determination of this matter was committed, believed that the most efficacious way for us to keep our people at home was for the Congress to come up here, see your good words, and return home and emulate them.

That hordes of Americans have emigrated from the United States into Canada is a well known fact—shall I say phenomenon? And why has this been so? We are here to solve the mystery and find an answer to the riddle expressed in the title of the play, "Why do our boys leave home"? We shall be all eyes and all ears and all memory. We shall purloin from you—not your purses, that is unnecessary, since you freely open them to us, not your enviable reputation, that is beyond destructive criticism; but we shall commit the greater crime, of stealing your splendid ideas. These we shall take back with us. And we now serve notice on you that this flood of emigration from a land, which, with characteristic Yankee modesty, I may proclaim to be quite as attractive as your own fair country, will from now, henceforth, and forever cease. The real fact is that it was not the Board of Governors that made a blunder in accepting your invitation, but rather was it the mistake of Calgary in extending it.

Anent this subject, I find in the monumental work on Irrigation Law by my recently deceased friend, Clesson S.

Kinney of the Salt Lake City bar, this well deserved tribute to the English race:

"It seems to be a general tendency of the English people, the moment that a colony swarms out from the mother country into a new and manytimes wilder country, to begin the development of its natural resources at the earliest possible moment, and to the greatest possible extent. And as agriculture is the main resources of life, and in many of these countries it can not be developed to its fullest possibilities, if at all, without irrigation, it therefore follows that irrigation is developed in its aid. Neither is this done without system, or in a haphazard, careless manner; but their operations, both upon the practical side of the question and in the enactment and enforcement of laws and regulations, are based upon experience as gleaned from all parts of the world. At the same time, while developing the resources of a country, it is also the tendency of the English people to conserve those natural resources to the greatest possible extent consistent with that development. The theory is that the empire of England was not built for a day; and, therefore, no one generation should rob the earth of its fruits, but that these countries should be handed down to posterity in such a condition that it might also enjoy some of these fruits. The wise laws and forest policies, the laws tending to conserve the flow of streams, the laws regulating the use of mineral lands, the laws for the protection of the soil, and the drainage laws of the English colonies, are among the best that can be found on earth. And, with these just laws and policies is it any wonder that the British Empire has spread out until it governs in all parts of the world.?"

I have a sense of almost insufferable pride in being called, by the accident of circumstance and not through desert, to preside over a Congress having such an extended and useful career, dealing with and seeking to solve and with much success, those problems of profound difficulty and vital importance that are inherent in the great subject of irrigation, and likewise in being associated with you who have achieved such conspicuous mention in the modern epic of irrigation.

This subject, the furtherance of which is specially committed to this Congress demands the consideration and solution of intricate and profound problems in engineering, law, agriculture, and sociology. We worship at the shrine of Irrigation, since she is a veritable goddess of reclamation—what more noble word in the language! Your local problem has been to reclaim these grass covered prairies to more useful and diversified crops, while our problem in arid America has been to bring about a greater, though possibly no more difficult, transformation from greasewood to apples and alfalfa—and the blessed aim of the irrigationist here and there and

everywhere and in every age of the world has been to create—yes, create, that is the precise word—happy homes and certain success out of conditions always uncertain, usually unpromising and frequently of the most heart-breaking adversity.

You are familiar, many of you, with the “Howling Wilderness” speech of Daniel Webster delivered in the United States senate about the time of the Mexican acquisition. He said:

“What do you want of that vast and worthless area, that region of savages and wild beasts, of deserts, of shifting sands and whirling wind, of dust, of cactus and prairie dogs? To what use could we ever hope to put those great deserts and those endless mountain ranges, impenetrable and covered to their very base with eternal snow?”

Such was the general impression and such indeed was the fact, generally speaking, in respect of the arid west. It is to the everlasting credit and honour of the science of irrigation whose votaries we are, that it has supplied a complete and altogether delightful answer to the great statesman’s question, “To what use could we ever hope to put those great deserts and those endless mountain ranges?” Truly such cheerless conditions are passing away under the magic touch of water. Science has bidden the desert drink; the parched and fruitless earth has become green and fruitful; and most happy are we that it has fallen to our lot to contribute, some of you mightily, to a consummation so devoutly to be desired.

In his pamphlet on “Irrigation Farming”, Mr. L. A. Wilcox in summarizing the advantages that irrigation has brought to humanity throughout the ages, states:

“We may conclude that irrigation means better economic conditions; means small farms, orchards, and vineyards; more homes and greater comfort for men of moderate means. It means more intelligence and knowledge applied to farming, more profit from crops, more freight and more commerce—because special products of higher grade and better market value will be enhanced. It means association in urban life instead of isolated farms. It means the occupation of small holdings. It means more telephones, telegraphs, good roads, and swift motors; schools in closer proximity; villages on every hand; and such general prosperity as can hardly be dreamed of by those who are not familiar with the results of even the present infancy of irrigation in America.”

It has been pointed out that the development of irrigation has brought about certain concomitant benefits, scarcely less valuable than its direct blessings—it prevents floods through storage; it aids navigation by maintaining sufficient water throughout the dry season; it reclaims the swamps by preventing river overflow; it conserves the soil by depositing silt; it aids in the development of power through storage and

equalizes stream flow; and it exerts, probably, a moderating effect on the climate.

Irrigation was practised back beyond the dawn of history. It is said in the second chapter of Genesis that "A river went out of Eden to water the garden;" and the unknown author of Ecclesiastes boasts; "I made me great works: I builded me houses: I planted me vineyards. I made me gardens and orchards and planted trees in them of all kinds of fruits. I made me pools of water to water therewith the wood that bringeth forth the trees."

In nearly all parts of the earth are found numerous and extensive ruins of reservoirs and canals. Some are situated in regions which are now populous and were abandoned for causes now only to be surmised; others are Turkestan, Upper Egypt, Mesopotamia and elsewhere, regions which have nearly ceased to be populated. This latter fact led Oscar T. Crosby, a college mate of mine, in his book on "Tibet and Turkestan" to write respecting the irrigating agriculturist as:

"Safe against climatic risks; crowded in small holdings, dependent on combined action for the construction of irrigation works; the ready victim of any violence which seizes some certain ditch. Contrast him with his brother who lives by the grace of uncertain rains; forced to a prevision which makes the lean year borrow from the fat: able to live wide away from his neighbour, developing thereby an independent individualism which may ripen into civil order and liberty; each farmer whose land has its own water supply capable of making some military resistance."

He adds respecting western America:

"The vast development of irrigation works now progressing in the far western states of America will inexorably produce, generations hence, a type far less hardy in mental constitution than that which we now present. Were it not that these new regions are part of a vast country, chiefly filled with people who must fight uncertainties, and were it not that no great neighbour lies close to their irrigated field, we might well hesitate to produce the conditions which shall, in turn, be the source of enormous wealth and little virility. Mesopotamia, Egypt, Bengal, Middle China, Mexico; since the first ditch was dug in your yielding soils, how many billions of slaves have been engendered, fed, and reclaimed in death by your thirsty sands? How many fretting tyrants have come down, with the fresh mountain dews upon their brows to riot in your slave-breeding plains and fatally to breed a later race of slaves, whose necks have also bent to later mountain men?"

But while my friend Crosby's conclusions are extremely interesting and while history will confirm his statement and

prediction that effeminacy has ever yielded and must ever yield to masculinity, yet his conclusions should be extended to any community, whether or not irrigation predominates therein, where population is dense, where wealth has succeeded poverty, and where the fear and necessity of warfare have yielded to a reign of peace. But we have a very, very modern instance that dense and wealthy populations are not necessarily sheeplike in their docility; and one will conclude that a band of hostile and fretting Himalayans with the mountain dew fresh on their brows would have a sorry experience on the "slave-breeding plains" of northern France.

Speaking of ancient irrigation it is quite an interesting fact that down in New Mexico and thereabouts, are the remains and evidences of numerous and important irrigation enterprises of considerable antiquity, and doubly interesting is it that in numbers of instances, notably at Mesa City, these ancient works have been restored to latter-day usefulness.

Turning from these phases of the subject to our own day, it may be repeated that nearly every country between the Arctic and Antarctic circles now practises irrigation—even our mother country. England has thousands of acres of irrigated meadows. Conspicuous among works of this character are the vast enterprises of Lombardy and Sardinia, constructed and operated under laws and regulations of an almost ideal character. Then there are the great distributing systems of India and, better known, the epoch-making dam of Assouan, the modern representative of what appears to have been a series of similar dams, remains of which now serve to mark and produce the almost equi-distant cataracts of the Nile.

Of modern irrigation on this continent, it appears to have fallen to the good fortune of the people with whom I am identified, to have been the pioneers. Mr. William E. Smythe of Los Angeles, perhaps the father of the Irrigation Congress (but it is a wise congress that knows its own father) in his absorbing work, "The Conquest of Arid America," points out that the incentive for the settlement of California, Colorado, Nevada, Idaho and Montana was generally mining; of Wyoming, stock raising; and of Utah, home-making pure and simple. Respecting the settlement of Utah, Mr. Smythe says:

"First of the Anglo-Saxon race, the 'Mormons' encountered the problem of aridity, and discovered that its successful solution was the price of existence. Brigham Young had lived in Vermont, Ohio, Missouri and Illinois. Neither he nor any of his followers had ever seen a country where the rain-fall did not suffice for agriculture, nor ever heard of one save in the Bible. But they quickly learned that they had staked their whole fortune upon a region which could not produce a spear of tame grass, an ear of corn, nor

a kernel of wheat without skilful irrigation. Of the art of irrigation, they were utterly ignorant. But the need of beginning a planting was urgent and pressing, for their slender stock of provisions would not long protect them from starvation.

"It was this emergency which produced the first irrigation canal ever built by white men in the United States. 'Mormons' are prone to believe that the suggestion of this work was a revelation from God to the head of the Church. Other traditions ascribe it to the advice of friendly Indians; to the example of the Mexicans; to the shrewd intuition with which the leader had met all the trials encountered in the course of his adventurous pilgrimage. Whatever the source of inspiration, he quickly set his men at work to divert the waters of City creek through a rude ditch and to prepare the ground for Utah's first farm. These crystal waters now furnish the domestic supply for a city of 60,000 [100,000 in 1914] inhabitants. The late President Wilford Woodruff, who was one of the party assigned to the work of digging the first canal, related that when the water was turned out upon the desert, the soil was so hard that the point of a plough would scarcely penetrate it. There was also much white alkali on the surface. It was, therefore, with no absolute conviction of success that the pioneers planted the very last of their stock of potatoes and awaited the result of the experiment. The crop prospered in spite of all obstacles, and demonstrated that a living could be wrung from the forbidding soil of the desert when men should learn to adapt their industry to the conditions.

"Such was the humble beginning of modern agriculture in arid America. The success of this desperate expedient to preserve the existence of a fugitive people in the vast solitude has made Utah our classic lands of irrigation, and given the 'Mormons' their just claim as the pioneer irrigators of the United States."

Brigham Young is frequently and, perhaps not inappropriately, styled the modern Moses. But, so far as climatic conditions are concerned, it appears that the experiences of Moses and his modern counterpart were reversed. We read in Deuteronomy: "For the land, whither thou goest in to possess it, is not as the land of Egypt from whence ye came out, where thou sowedst thy seed and wateredst it with thy foot as a garden of herbs," the reference being to some ancient irrigating device similar, no doubt, to those in use in modern Egypt—"But the land whither ye go to possess it is a land of hills and valleys and drinketh water of the rain of heaven."

A good story is current among the "Mormons," illustrative of their dependence upon irrigation and of their tendency to

attach even spiritual value to affairs usually considered to be of the earth peculiarly earthy. A "Mormon" elder, serving as a missionary in charge of a band of half civilized Indians was about to depart on a journey that would absent him over Sunday. He called the Indian chief and asked him to hold religious services as usual on the approaching Sabbath and requested the chief to preach the sermon to his fellow tribesmen. The chief promised to do this. "What will you preach about?" asked the elder. And the Indian chief, remembering the theme of many and many sermons that he had heard said: "I preach 'em water-ditch, water-ditch, water-ditch."

The history of irrigation and the treatment of its allied problems throughout all of Western America may be discovered, in the main and with reasonable accuracy, in the development of the territory and state of Utah, which you will pardon me for especially mentioning because of my greater familiarity with its history.

First came the lonely pioneer with his dam of brush and cobble stones thrown across a small mountain stream, and his primitive distributing devices; then the "big field ditch" heading in a more elaborate dam of planks and boulders on a larger stream, with a rude gate and a main ditch or canal from which the several landowners interested, diverted their shares of water through smaller laterals. In Utah, this class of ditch was first constructed by co-operative effort, little or no cash was called for or expended and the proportional interest of each irrigator in the stream diverted depended upon the number of days work done by him and his boys and his teams. There was no capital stock and the certificates issued represented merely proportionate parts of the water available.

I remember having seen, down in Sevier county, the surveying instrument—perhaps better described as a tool—with which the pioneer surveyor, James M. Peterson, laid out the Richfield canal, still satisfactorily filling the measure of its creation. The instrument referred to was a level constructed of a horizontal piece of gas pipe about two feet long, with an inverted bottle fitted upright on an elbow at each end. This was filled with coffee, not strong enough however to affect the nerves of the machine, and our Danish engineer, sighting over the upper surfaces of the coffee in the two bottles, determined the level of the country with unerring accuracy.

The water in the river being exhausted, a number of these ditch companies combined to build an earthen dam reservoir, fifty miles away, perhaps, at a favourable site on one of the forks of the stream—this without a cash capital—but by co-operative effort and a resulting proportionate

ownership. But the day came when all this more easily obtained water was diverted and an enlarged and new supply must come from mammoth and expensive reservoirs and through canals constructed high and expensively along the rugged mountain slopes. These enterprises invited the investment of capital and demanded the forming of corporations with shares of capital stock, each having prescribed water using privileges; and possibly required the issuance of bonds. Then came the Carey Act in which there was a species of co-operation between the federal and state governments and private enterprises—a legislative scheme of wide application and great beneficence. And the several states, through land grant funds and direct legislative appropriations, have taken a part in this great quest of agricultural development and supremacy.

The crowning effort of all in the States, has been the far-reaching, almost inconceivably glorious federal law of 1902, known as the Reclamation Act, the director from the beginning under which, Hon. F. H. Newell of Washington, D. C., honours this Congress with his presence. Under this act, whose author and general sponsor was my immediate predecessor in the presidency of this Congress, Senator Newlands of the state of Nevada, the vast fund derived from the sales of public lands, amounting to an approximate sum of \$100,000,000, and still growing, is being devoted to the development of promising enterprises throughout the arid west under the direction of the government at Washington.

And so, irrigation engineering has progressed from the brush dam and the two foot ditch, to the great Roosevelt dam in Arizona, overtopping in height the capitol at Washington and to the Strawberry tunnel in Utah, miles in length and piercing a mountain range. And the capital required for development has increased from the unaided brawn of the isolated pioneer to the almost unrestricted resources of a great nation. In the domain of law, irrigation has come up through much sorrow and tribulation, from which by no means, is it yet relieved. At first, there was no law—only the customs of the settlers—then the fragmentary federal law of 1866 recognizing the right of appropriation. With us in the United States, there has been a jumble of laws and decisions recognizing here the old riparian doctrine of the common law, either intact or modified, and elsewhere spurning it entirely; in one state, the contention that the unused waters belong to the United States, and elsewhere, the asseveration that they belong to the state; here the view that the water is an inseparable adjunct to the land, and in other places, the recognition of the right to sell and dispose of it as separate property; in one jurisdiction, the right

of priority of appropriation for any beneficial purpose, and in another, the provision that certain uses, in a prescribed sequence, should be deemed more beneficial than and have preference over other uses.

And complicating these and many more similar rules are the practical difficulties, arising from improper and insufficient hydrographic data, from the great variability of the streams from year to year, from the constantly changing and uncertain duty of water, from the increase in acreage by prior appropriators in derogation of secondary rights, and so on ad infinitum. But happily many of our states and your own blessed province have not been compelled to work out results through these obstacles. You have been guided by a greater wisdom. Possibly the lamp that has guided your feet has been the lamp of our experiences.

With us, system has grown out of chaos, and we are now sailing over fair seas, though somewhat perturbed by winds blowing out of our stormy past.

What splendid progress has been made in the agricultural problems surrounding the science of irrigation! We are learning rapidly when to irrigate and when not to apply the magic fluid. We are learning that the average duty of water is more nearly 150 acres per second foot of continuous flow, as you provide by statute, than 50 acres, as our farmers demanded in the early days. Dr. Widtsoe, the president of the efficient Utah Agricultural College and author of leading works on dry farming and irrigation, read before the last session of this Congress a startling paper on the mis-use, namely the excessive use of water, demonstrating that the past practices of irrigators have been highly injurious and often destructive.

But the winter of our discontent in respect of the engineering, financial, legal, and agricultural aspects of irrigation is made glorious summer by the sun of experience; and there remains but one great problem that must be solved before these vast modern irrigation enterprises, public or private, can reach their full fruition—it is the problem of so adjusting the financial burdens of the settler under our reservoirs and ditches that the average farmer can successfully carry them through the goal. High priced water, high priced land, soil in a state of nature, lack of irrigation experience, a new sky and a new earth, strange markets, unfamiliar surroundings—of such is the kingdom of distraction and of frequent failure.

Your great Canadian Pacific, the good people of Australia, and promoters here and there in the United States, are doing much to assist the settler through his trying pioneer years. This policy is a great benefaction; but experience has demonstrated that the period of full payment for land and water

must be so greatly extended that private capital can scarcely hope for an adequate return on its investments—a fact that has led Secretary of the Interior Lane to say: “It appears that no further large development can now be expected unless it is (a) by the use of public funds, state or national, upon which no profit or interest is required, or (b) by the use of funds procured by taxation as in the case of irrigation districts.” He might have added a third class, the case of great land-owning railways, where profits from the sale of land and water are treated as insignificant compared with the railway traffic from the growth of population.

In the United States few irrigation systems of importance are now being planned or built owing to lack of funds; and under certain of our projects the exodus of disappointed home-seekers is greater than the inflow, this due to financial requirements; in some measure to the lack of direction and oversight by experienced and tactful men; and to a great extent to the large and unwieldy size of the farm unit. Success, however, has usually attended those companies that have both built the irrigation system and have owned the land under it.

Director Newell writes: “It is apparent that the question immediately at issue is not so much the taking up of new projects, but rather the immediate bending of all available energies toward the solving of problems which now confront us upon existing projects whether built by public or private capital, the meeting of financial obligations incurred in connection therewith, the education of the settlers upon the projects, the use of water, the care of the land, the production and marketing of crops, and irrigation farming in general as a business.”

Happy our lot to play a part—though mine is but to strut for a brief moment upon the stage—in the modern miracle play of irrigation; to be the means, though never so humble, of contributing to the happiness of mankind; and glorious the thought that we act and execute not merely for the moment but for generations yet unborn!

I cannot refrain from quoting, in conclusion, an eloquent, even majestic, tribute to the permanent blessedness of enterprises designed to slake the thirst of man, beast and soil, first published in the *Edinburgh Review*, and written by an author whose name I have not been able to ascertain.

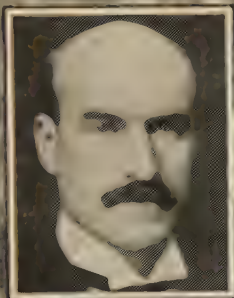
“Although the tomb of Moses is unknown, the traveller of to-day slakes his thirst at the well of Jacob. The gorgeous palaces of the wisest and wealthiest of monarchs, with their cedar and gold and ivory, and even the great temple of Jerusalem, hallowed by the visible glory of the Deity himself, are gone; but Solomon’s reservoirs are as perfect as ever. Of the magnificent and costly architecture of the Holy City,

not one stone is left upon another, but the pool of Bethsaida commands the pilgrim's reverence at the present day. The columns of Persepolis are moldering into dust, but its cistern and aqueduct remain to challenge our admiration. The golden house of Nero is a mass of ruins, but the Aqua Claudia still pours into the city of Rome its limpid stream. The temple of the sun, at Tadmor in the wilderness, has fallen, but its fountain sparkles in the rays of the morning as when thousands of worshipers thronged its lofty colonades. And if any work of this generation shall rise over the deep ocean of time, we may well believe that it will be neither a palace nor a temple, but some vast aqueduct or reservoir; and if any name shall hereafter flash brightest through the mist of antiquity, it will probably be that of the man who in his day sought the happiness of his fellow men and linked his memory to some such work of national utility or benevolence."

I thank you, Ladies and Gentlemen. (Applause).

PRESIDENT YOUNG: We will now be favoured with a solo, "The Song of the Motherland," by Miss Zelig Delsart. (Applause)

PRESIDENT YOUNG: We will now ask for the report of the Executive Committee.



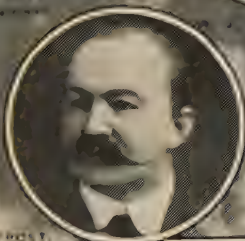
C. M. NEURDGE
VICE CHAIRMAN



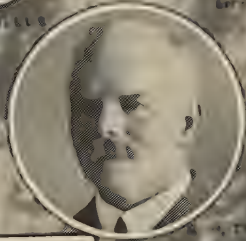
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ANDREW MILLER
SECRETARY



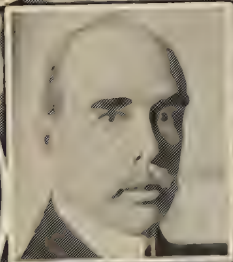
A. P. FOOST



E. A. THOMAS



J. W. HAVESON



J. S. DOMINGUE



W. BRUCE JONES



H. I. HUTCHINGS



J. H. HANCOCK



E. S. RICHARDSON

EXECUTIVE COMMITTEE, CALGARY BOARD OF CONTROL

The report was read by Secretary Hooker, as follows:

REPORT OF
The Executive Committee
OF THE
TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS

To the President and Delegates of the Twenty-first International Irrigation Congress.

Gentlemen:—

The Executive Committee met, pursuant to the call of Richard W. Young, Chairman of the Retiring Executive Committee, at the Hotel Utah, Salt Lake City, immediately following the adjournment of the 20th Congress, on October 3rd, 1912.

There were present: President Richard W. Young; Vice-Presidents J. B. Case, John Fairweather, S. H. Lea, R. F. Burges, Kurt Grunwald; Past Presidents Geo. E. Barstow and Francis G. Newlands; Secretary Arthur Hooker; and the following members selected by their state delegations:

F. S. Lack, of Arizona; John A. Fox, of Arkansas; Douglas White, of California; C. W. Dickson, of Canada; Lou D. Sweet of Colorado; Miss Frida Sanford, of Connecticut; C. W. Hill, of Idaho; Geo. B. Turner, proxy for D. H. Anderson of Illinois; Mrs. Charles B. Andrew, of Indiana; M. F. P. Costelloe, of Iowa; Thomas Knight, proxy for F. L. Vandegrift of Missouri; L. Newman, of Montana; Prof. O. V. P. Stout, of Nebraska; James G. Givens, of Nevada; W. S. Hopewell, of New Mexico; Truman G. Palmer, of New York, E. F. Bohm, of Ohio; Harley J. Hooker, of Oklahoma; J. T. Hinkle, of Oregon; C. L. Millett, of South Dakota; J. A. Smith, of Texas; George A. Snow, of Utah.

George A. Snow was named Chairman of the Committee, and Arthur Hooker was elected Executive Secretary.

Proceeding to the election of three members to serve on the Board of Governors, L. Newman of Montana, Douglas White of California, and Lou D. Sweet of Colorado, were named.

In a report from the Board of Governors, which is appended hereto and included as a part hereof, the work of the Board since the meeting at Salt Lake City is reviewed. The attention given the affairs of the Congress by the Board of Governors has made it unnecessary for the Executive Committee to assemble prior to the meeting at Calgary, to receive the report of preparations for the Congress in Calgary, and to review the tentative programme. At the same time, the Exe-

cutive Committee, both through correspondence and the medium of the official bulletins of the Congress, have been kept informed of the important developments and actions in connection with the work of the Board of Governors.

INTERNATIONAL FEATURES

Most important of the actions taken by the Board of Governors was the acceptance of the invitation from the city of Calgary to hold the 21st meeting in that city. This action of the Board was significant in two respects, as it placed upon them the responsibility of naming the place of meeting, and also, for the first time, took the organization without the borders of the United States.

It seems particularly appropriate at this time, when a large part of the world is engaged in war, that the meeting here of those interested in the development of our arid regions demonstrates to the world that there is no international boundary in irrigation and agricultural development in general.

RE-ORGANIZATION OF THE CONGRESS

The experience of the last two years has proved the wisdom of the re-organization of the Irrigation Congress, which was discussed at the 15th session, effected at the 16th, carried into effect at the 17th, and broadened and extended at the 18th, 19th, and 20th meetings, the essential feature of which is the empowering of the Board of Governors, subordinate to the Executive Committee, to act for that committee between sessions of the Congress. This relieves the committee members from anxiety, labour and more or less frequent meetings, and at the same time gives more definite aims to the congressional body, thereby ensuring its continuity and increasing its influence as a power for the growth of the semi-arid regions and the country as a whole.

A feature of the organization is the Board of Control, a local committee, bearing somewhat the same relation to the Board of Governors that the latter does to the Executive Committee, and the Executive Committee to the Congress itself.

BOARD OF CONTROL

In accordance with the custom of the Congress, conforming to the provisions of the constitution, preparations for the meeting at Calgary have been in charge of the Board of Control. The Secretary of the Congress moved the headquarters to Calgary early in March, soon after the execution of the contract with the city of Calgary. The organization of the Board of Control was undertaken at

a meeting called by His Worship, Mayor H. A. Sinnott of Calgary, and was eventually completed with Mr. J. S. Dennis, Assistant to the President of the Canadian Pacific Railway Company, as Chairman, and Mr. Andrew Miller, Secretary of the Industrial Bureau, as Secretary of the Board. The membership includes some seventy odd members, from the provinces of Alberta, British Columbia, Manitoba and Saskatchewan, thoroughly representative of Western Canada. Committees were eventually organized with heads as follows:

Decorations Committee.....	Ald. E. H. Crandell, Chairman
Entertainment Committee....	James W. Davidson, Chairman
Exhibits Committee.....	E. L. Richardson, Chairman
Finance Committee.....	C. G. K. Nourse, Chairman
Publicity Committee.....	Norman S. Rankin, Chairman
Reception Committee.....	Ald. T. A. P. Frost, Chairman
Transportation Committee...	R. J. Hutchings, Chairman
Music Committee.....	A. W. Pryce-Jones, Chairman
Hotels and Accommodations.	Ald. W. J. Tregillus, Chairman

It is interesting to note that at least two members of the Board—namely, Mr. Dennis and Mr. Pearce—were delegates to some of the earliest meetings of the Irrigation Congress, having attended both the 3rd Congress at Denver in 1894, and the 4th Congress at Albuquerque in 1895; while Mr. Dennis was also one of the speakers at the 17th Congress at Spokane in 1909.

It is needless to state that the work of the Board of Control has been most energetic and efficient; the results speak louder than words. It is difficult for the public generally, or even the delegate who finds the preparations for the meeting all made upon his arrival, to realize how greatly the success of any meeting depends on the fidelity and zeal of the members of the local board. It is with great pleasure that the Executive Committee acknowledges the great debt of the organization to the business men, officials and citizens of the city of Calgary and provinces of Western Canada, who made possible the local organization and supplied it with the necessary funds.

PROGRAMME

The tentative programme submitted for this meeting to the Irrigation Congress speaks well for the work of the representatives of the Board of Control and Board of Governors who had its preparation in hand. It is the ripened product of weeks, and even months of correspondence and conference. It was the aim to prepare as valuable a programme as the Irrigation Congress had ever had. It is believed, in many particulars, this aim has been fulfilled, and that the Congress will have the pleasure and profit of listening

to papers, the value of which cannot be over-estimated in their relation to the future development of Western Canada and the United States.

FOREIGN REPRESENTATION

It is indeed a curious coincidence that the first meeting of the Irrigation Congress to be held without the United States should be so lacking in foreign representation, but an explanation of the difficulties to secure foreign representation is hardly necessary. In accordance with the custom of years, formal invitations were prepared for the interested countries of the world, and the Dominion Department of State had graciously consented to forward them. However, upon the outbreak of hostilities, there was hardly need for the Dominion Government to suggest that it was inappropriate for the Dominion to extend invitations to an international gathering of this character, while the Empire, of which it is a part, was at war. It was necessary to recall the invitations to foreign governments, leaving representation practically confined to irrigators from Canada and the United States.

Nor is there any reason why we should not mention that, at one time, the advisability of postponing the meeting was seriously considered, on account of the absence of foreign representation and the uncertainty of future developments, as well as the situation which seemed to call for the curtailment of expenditures. However, after consideration by the full Board of Control, it was deemed better to hold the best possible meeting under the circumstances than to attempt to postpone the plans with the probability that it would be impossible to retain the meeting for another year in Canada.

OFFICIAL BULLETIN

The Executive Committee is pleased to report that the hearty support given by the local Board of Control has enabled the continuation of the publication this year of the Official Bulletin. This publication was begun only with the preceding Congress. The Committee feels that its continuation is an important work, and that the accumulation of volumes with succeeding Congresses will prove to be of more and more importance.

ABSENT MEMBERS

The Executive Committee regret to report that since the last meeting, there have passed away from the members of the committee, James G. Givens, Executive Committeeman from Nevada, and C. B. Boothe, of Los Angeles, Past Presi-

dent. Mr. Boothe, particularly, had given long years of service to the work of the Irrigation Congress.

PROPOSED AMENDMENTS TO THE CONSTITUTION

In line with the increasing usefulness and influence of the International Irrigation Congress, it has seemed wise to the Board of Governors, and the suggestion has been approved by the Executive Committee, to enlarge the sphere of representation to a certain degree by adding to the list of those who are entitled to make appointments the members of the State Legislatures. To meet the requests which arise each year for a considerable number of delegates from the place where the Congress meets, it has, in view of the burdens undertaken by the entertaining city, been recommended that the Mayor of the city where the Congress meets be authorized to appoint twenty-five delegates instead of ten, as under the present provisions of the constitution. It is also recommended that the distinction as to the number of delegates appointed from cities under twenty-five thousand population be altered so that all cities and towns of less than twenty-five thousand inhabitants be entitled to five delegates each. In line with this, it is also recommended to increase from two to five the number of delegates to be appointed by associations devoted to irrigation, agriculture, horticulture, and engineering, as well as from irrigation or canal companies, and colleges.

Accordingly, the amendments now proposed and recommended for favourable action by the Congress are as follows:

ARTICLE VII

Amend Section 1 by inserting after the clause numbered (1), to form clause (2): "Ten delegates to be appointed by each member of the highest legislative body of any nation."

Amend the same section further by inserting after the new clause numbered (2), to form clause (3): "Five delegates to be appointed by each member of the State Legislature."

Amend the same section further by inserting after the new clause numbered (3), to form clause (4): "Twenty-five delegates from the city in which the Congress is to meet, to be appointed by the Mayor."

Amend the same section further in clause numbered (2), by changing (2) to (5).

Amend the same section further in clause numbered (3) by changing (3) to (6); and strike out the words "and over one thousand," so that the clause shall read: (6) "Five delegates from each city or town having a population of less than twenty-five thousand, to be appointed by the Mayor or chief executive."

Amend the same section further in clause numbered (4) by changing (4) to (7).

Amend the same section further in clause numbered (5) by changing (5) to (8).

Amend the same section further in clause numbered (6), by changing (6) to (9), and by substituting for the word "Two" the word "Five," and by striking out the words "Each incorporated town having a population of less than one thousand," so that the clause shall read: "(9) Five delegates from each regularly organized association devoted to irrigation, agriculture, horticulture, and engineering, from each irrigation or canal company, and from each college."

Amend the same section further in clause numbered (7) by changing (7) to (10).

Amend the same section further in clause numbered (8) by changing (8) to (11).

Amend the same section further in clause numbered (9) by changing (9) to (12).

Amend the same section further in clause numbered (10) by changing (10) to (13).

Amend the same section further in clause numbered (11) by changing (11) to (14).

RULES FOR THE CONGRESS

The Executive recommends that the rules for the guidance of the Congress as adopted at the Spokane session, and modified at Pueblo, Chicago, and Salt Lake City, be adopted for the present session. These rules are appended.*

ACKNOWLEDGMENT

In presenting this report to the Congress, the Executive Committee feels it is only just to express special acknowledgment, first to the Board of Governors, for the manner in which they have guided the affairs of the Congress through the trying period since the Salt Lake City meeting, and second to the Board of Control, for the energy and material assistance which they have brought to the Congress, and particularly in the faithful manner in which it has carried out its obligations under the distressing conditions which have developed throughout the British Empire during the preparations for the Congress.

It is fitting also to acknowledge our debt to the President and Secretary of the Congress, for their faithful attention to the duties which have devolved upon them.

Finally, we acknowledge for ourselves, on behalf of the 21st International Irrigation Congress, the deep obligation

*These rules and the revised constitution will be found in the appendix to this volume.—Editor.

to the people of this great city, the centre of an Empire in itself, for the interest in and support of the work of the organization, without which there would have been no possibility of success for this meeting. (Applause)

Respectfully submitted,

(Signed) J. B. CASE,

Vice-Chairman

ARTHUR HOOKER,

Executive Secretary.

REPORT OF

The Board of Governors

Appended as Part of The Executive Committee Report

To the Executive Committee of the Twenty-first International Irrigation Congress:—

Gentlemen:

With the assembling of the Executive Committee for the meeting of the twenty-first International Irrigation Congress, the Board of Governors in transferring the duties and responsibilities to the full committee, have the honour to report progress up to this date.

The Board met for organization at the Hotel Utah in Salt Lake City on the afternoon of October 3rd, 1912, there being present Messrs. Snow, Young, Hooker, White, Sweet, and Newman. Without dissenting voice, Mr. Snow was named Chairman, and Mr. Hooker, Secretary.

A second meeting of the Board was held at the Hotel Utah in Salt Lake City on the morning of October 4th, 1912, there being present Messrs. Snow, Young, White, Sweet, Newman, and Hooker, together with Executive Committee-man F. S. Lack of Arizona.

A further meeting of the Board was held in the office of Chairman Snow, Room 310, Judge Building, Salt Lake City, on January 24th, 1913, there being present Snow, Young, and Hooker, and the action of the meeting being later approved by Messrs. White, Sweet, and Newman.

On February 14th, 1913, the Board met again in Room 310, Judge Building, Salt Lake City, the members present being Messrs. Snow, Young, White, Sweet, and Hooker.

The Board again met in the Hotel Palliser at Calgary, on the afternoon of October 3rd, 1914.

Unusual responsibilities devolved upon the Board through the failure of the Congress to meet in 1913. In this connection it is interesting to note that this was the third time that the Congress skipped a year; in previous years, no meetings having been held in 1892 and 1901.

At the meeting in Salt Lake City the committee on Permanent Organization recommended Phoenix for the meeting of the Congress in 1913, the report of the Committee being adopted.

Following the adjournment of the Congress, negotiations were entered into between the Board of Trade of Phoenix and the Board of Governors relative to the details of arranging for a session in Phoenix. Executive Committeeman F. S. Lack, of Phoenix, was present at the meeting of the Board on October 4th, 1912, at Salt Lake City, and later, following interchange of views through letters, the city of Phoenix was visited both by Douglas White and Secretary Hooker. It was found impossible to agree on details for the holding of the meeting, and the usual contract with the representatives of the Irrigation Congress was not entered into by the Phoenix Board of Trade.

In a letter of March 29th, 1913, to the members of the Executive Committee and others interested in the Irrigation Congress, Chairman Snow wrote:—

"The city of Phoenix has decided that it cannot at this time properly entertain the Irrigation Congress and the Board of Governors has before it the selection of another meeting place. Suggestions as to available places or invitations from cities desirous of having the Congress in 1913 are invited promptly and will be carefully considered.

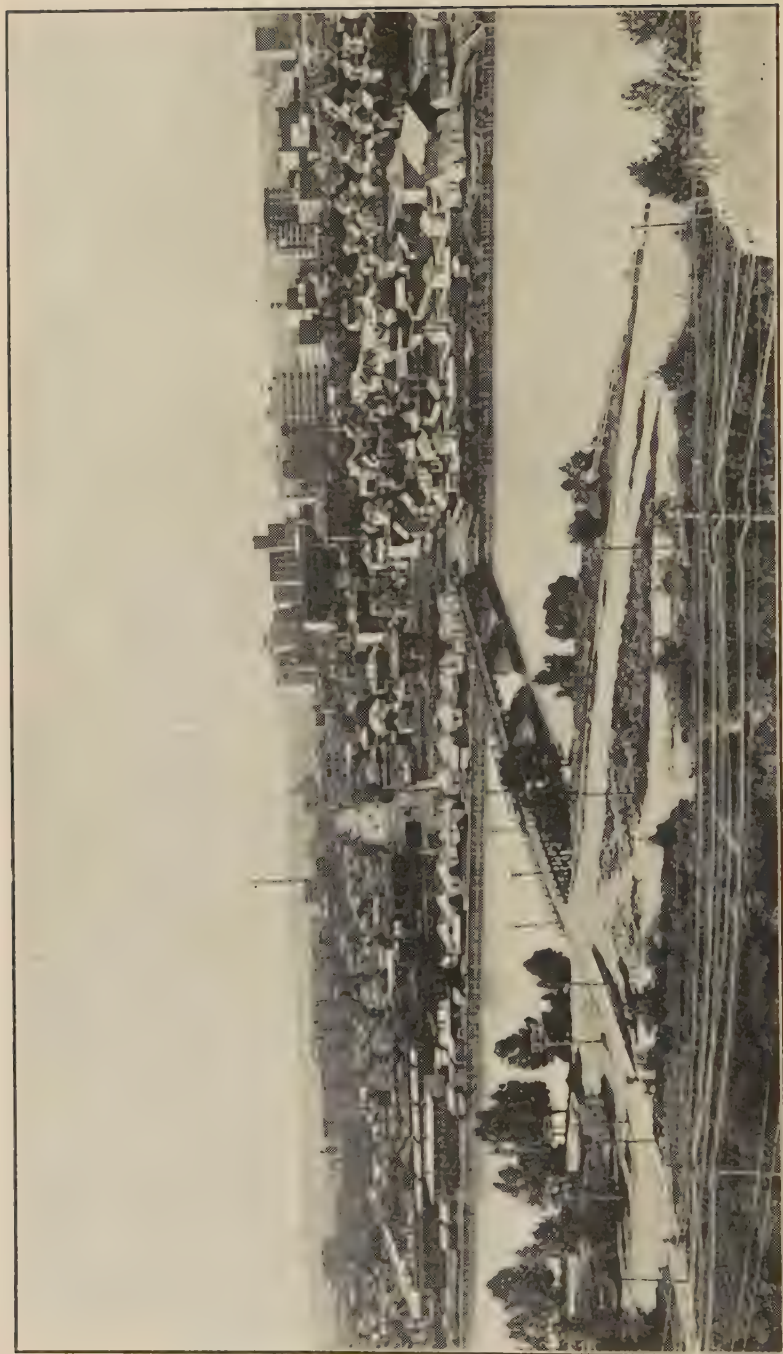
"The hostess city will be asked to provide office headquarters, a hall for the meeting, and a guarantee of \$7500 to be expended by the Board of Governors for the necessary expenses of the Congress. While some additional expenditures can be made advantageously, they are not absolutely necessary to a successful congress, hence they may be left optional with the local Board of Control.

"At an early date after an invitation is accepted, there will be required a bank deposit of \$2500, subject to the cheque of the Congress officers, the remainder of the \$7500 guarantee to be furnished as called for. Within two weeks after the deposit of \$2500 is available the headquarters of the Congress will be moved to the new meeting place."

No cities were found sufficiently interested to take up the matter at that time.

SELECTION OF CALGARY

At the first meeting of the Board in Salt Lake City, on October 4th, 1912, a communication was received from Norman S. Rankin, Permanent Secretary of the Western Canada Irrigation Association, containing an invitation from Commissioner Andrew Miller, of the Calgary Industrial Bureau, for the International Irrigation Congress to meet in Calgary in 1914. The Board decided it was not within



VIEW OF CALGARY.

its province at that time to act concerning the location of the 1914 Congress.

Commissioner Miller was not discouraged by the decision of the Board, but continued to keep in touch with the officers of the Congress and early in 1914 the invitation to meet in Calgary was renewed. The Board had before it no invitation from other cities, and negotiations were opened with Calgary by correspondence on the terms outlined in Chairman Snow's letter of March 29th, 1913.

Industrial Commissioner Miller was informed that the Board of Governors would entertain an invitation from the city of Calgary accompanied by the required guarantees to ensure the continuation of the permanent work of the Congress for the period of a year, whereupon an active campaign was begun in the city of Calgary to secure the necessary guarantees, and following the interchange of views among the Board of Governors, Industrial Commissioner Miller made a visit to Spokane for a conference with Secretary Hooker.

Acting under instructions from Chairman Snow, following his interchange of views with members of the Board, the usual contract required by the Congress was forwarded to Calgary early in February, and soon thereafter the contract was executed on behalf of Calgary by His Worship, Mayor H. A. Sinnott and City Clerk J. M. Miller, and twenty-five hundred dollars (\$2500) was deposited in the bank at Calgary to the order of the Board of Governors.

Advised that the contract had been executed and deposit made, Chairman Snow directed Secretary Hooker to remove the headquarters to Calgary and open the campaign for the 21st meeting.

OFFICIAL CALL

The Official Call was issued under date of July 30th by the officers of the Congress and the Executive Committee jointly with the Board of Control at Calgary, and, together with certificates for the appointment of delegates, was distributed generally throughout the United States and Canada. The Call was sent to the officers of the states, provinces, municipalities, various organizations and those entitled to make appointments as defined in the constitution. It is gratifying to report that the responses have been general, and on the whole, a lively and wholesome interest evinced in the first meeting of the organization to be held without the borders of the United States.

DATE OF THE CONGRESS

The week beginning October 5th was selected by the Board of Control as the most appropriate dates, after taking

into thorough consideration the conditions obtaining at that time throughout both the irrigated states and the provinces of Canada, and they have been found generally acceptable to those interested in the meeting.

PROGRAMME

The preliminary draft of the programme for the twenty-first Congress is submitted herewith. It provides for addresses by experts in irrigation and allied matters, for free discussion by delegates and for responses by representatives chosen by state delegations in a call of states.

In holding a meeting in Western Canada the Board felt that most favourable opportunities were offered for a study of colonization, perhaps the most important work in connection with irrigation development—putting men and women on the land under conditions which will bring about successful development. Probably nowhere else in the world have colonization methods been worked out with better results than in Canada, and nowhere can this subject be studied to better advantage. The Board believes that from the study of colonization at this meeting most important results will follow in the working out of the problems before the irrigated districts of the West to-day.

AMENDMENTS TO THE CONSTITUTION

Progress and development from year to year have emphasized the wisdom of changes and modifications of the organic law of the organization. The matter has been given serious consideration by the present Board of Governors, but the conclusions reached have not led to the recommendation of any radical changes in the constitution. Certain proposed amendments have been provided and are submitted herewith. It is recommended that if approved by the Executive Committee they be incorporated in the report of that committee and submitted to the Congress at its opening session.

Respectfully submitted,

(Signed) RICHARD W. YOUNG,

ARTHUR HOOKER,

President.

Secretary.

PRESIDENT YOUNG: You have the report; what is your pleasure with reference to it?

MR. GRUNWALD, of Colorado: I move the adoption of the report.

MR. L. NEWMAN, of Montana: I second that motion, Mr. President.

PRESIDENT YOUNG: The motion is to adopt the report of the Executive Committee. Are there any remarks?

Those in favour of the adoption of the report will say "Aye;" those opposed, "No." The motion is carried.

The adoption of the report carries the next item of business, namely, the adoption of rules for the Congress, which is automatically carried in the report which you have just passed. The Secretary has some announcements.

SECRETARY HOOKER: Mr. Sauder, Secretary-Treasurer of the Calgary branch of the Canadian Society of Civil Engineers, requests the announcement to be made that the Society have arranged to hold a complimentary dinner on Tuesday, October 6th, to the delegates to this Congress, who are members of the recognized British, Canadian or American Societies, or Institutes of Engineers, to be their guests at a dinner given in the honour of the visiting engineers, at Cronn's Rathskeller.

The dinner will begin at 6.30 o'clock sharp, and will be concluded in time to permit those attending the dinner, to be present at the reception to be tendered by the Lieutenant-Governor of Alberta, at the Palliser Hotel, the same evening.

The visiting civil engineers are requested to hand in their names without delay, at the Congress registration headquarters.

PRESIDENT YOUNG: The attention of the delegates is called to the Congress post office, which has been established at the headquarters, at the entrance to this building. Delegates and others should inquire at headquarters for their mail.

Under the provisions of the constitution of this Congress, the delegates from each state and province are called upon to organize with the election of a chairman, secretary, and executive committeeman of the Congress, to serve for the 22nd Congress, an honorary Vice-President of the Congress, and a member on each of these three committees: the committee on credentials, the committee on permanent organization, and the committee on resolutions.

Owing to the fact that there are a large number of delegates expected this afternoon and evening, the delegates will not be called upon to organize till to-morrow (Tuesday) morning, at which time an announcement will be made from the platform as to the meeting places of the various delegations, as determined upon amongst themselves.

There is a change in the programme. The address of Mr. M. C. Hendry on "Storage and Power Possibilities of the Bow River, West of Calgary," has been changed from Monday evening till Wednesday evening. The address of Mr. F. H. Newell, on "Water Storage and Distribution of the United States Reclamation Service," which is given in the programme

for Wednesday evening, has been changed to to-night, Monday, in place of the address of Mr. Hendry.

Secretary Andrew Miller, of the Board of Control, has some announcements.

SECRETARY MILLER: Ladies and Gentlemen: We regret if any person has been put to a little discomfort through the building not being so well heated as we would like it to be. The deficiency in the gas pressure has been responsible for it, but we have reason to believe that this afternoon and this evening the building will be warmer. Another reason is that it has been necessary to have the doors at the rear of the building open to receive exhibits, but we assure you that you will be comfortable here this afternoon and this evening.

I wish to state that we will have the street cars lined up here on Seventeenth Avenue, about fifty yards from this building, so you can take street cars up town. There are two or three street cars there now, waiting to take people up town as soon as this session ends.

Another matter. We will not have to walk through the mud again. We are arranging to have sidewalks extending from the Horse Show Building out to Seventeenth Avenue, and there will be no further discomfort such as you may have experienced this morning coming in.

The Members of The Women's Canadian Club and the American Women's Club of Calgary, acting in conjunction with the Entertainment Committee of the Board of Control, have arranged the following programme of entertainment for the ladies who accompany delegates to the International Irrigation Congress: Tuesday afternoon, October 6th, an afternoon Tea from 4 to 6 o'clock, at Cronn's Rathskeller. Wednesday afternoon, October 7th, a Theatre Party at 2.15 p. m. at the Grand Theatre. Following the Theatre Party, the visiting ladies are invited to be the guests of Mrs. F. H. Peters, Elbow Park, at tea. Thursday afternoon, October 8th, an automobile trip around the city, followed by tea in the Tapestry Room of the Hudson Bay Company.

All visiting ladies are cordially invited to these functions arranged in their honour and are requested to leave their names and hotel addresses at the Congress Registration Headquarters.

The Entertainment Committee of the Board of Control has provided a Ladies' Reception Room on the first floor of the Palliser Hotel for the use of visiting ladies, where members of the Local Ladies' Committee will be in attendance to show attentions to all lady visitors.

The Board of Control announces that in compliance with their request, His Honour, the Lieutenant Governor of Alberta, has kindly consented to hold an official reception

to all delegates to the International Irrigation Congress, and the lady friends who accompany them, also to the citizens of Calgary, in the Ball Room of the Palliser Hotel, between the hours of 9 and 10 o'clock on the evening of Tuesday, October 6th, and will be pleased to receive any one who can make it convenient to be present.

PRESIDENT YOUNG: That concludes our morning programme. I desire to invite the attention of all present to the excellent addresses that are provided for us this afternoon, and I trust that whatever inconvenience there may be in getting from the street cars to the building will not prevent a large attendance. The afternoon addresses are:

"Nation Building in Western Canada," by Mr. J. Bruce Walker, of Manitoba, Dominion Commissioner of Immigration.

An address by our friend, Mr. J. B. Case, of Kansas; First Vice-President of the International Irrigation Congress and Past President of the Trans-Mississippi Commercial Congress; also

"Settlement Policies of the United States" by Mr. D. W. Ross, Consulting Engineer for the State of California.

The session will be at 2.30 o'clock and the meeting will be called to order promptly at that hour.

If there is no objection, we will stand adjourned.

The Congress then adjourned until 2.30 p. m., October 5, 1914.



STREET SCENE IN CALGARY.

SECOND SESSION

MONDAY, OCTOBER 5, 1914

2.30 o'clock, p. m.

The Convention was called to order by President Young.

PRESIDENT YOUNG: The Congress will please come to order.

The suggestion has been made that it be in order for all delegates, and others present, to wear their hats, and if there is no objection, that will be the order of the day. (Applause).

While we are waiting for the temporary Sergeant-at-Arms to notify the members who are inspecting the exhibits, I will read a letter from a former President, twice President in fact, of this Congress:—

LETTER FROM PAST-PRESIDENT FOWLER

Phoenix, Arizona.

September 27th, 1914.

My Dear Mr. President:—

Your ringing appeal of the 14th inst., stirred my blood. Were it possible, I would not fail you at Calgary next month, for I well know, and fully realize, how much you will need a body-guard of old war horses to "lift up your hands", co-operate and "blaze the trail" for the Congress.

But my health will not permit so long and strenuous a journey and I must be satisfied with meagre newspaper reports, and the Official Report, weeks later. However, I need not assure you how keenly interested I shall be in the "Proceedings", and shall be with you in spirit if not in body.

The work of the Congress is by no means done, as some are pleased to say, nor will it be so long as "*Patriotism*", "*Public Spirit*", and "*Love of Service for Others*" shall exist. Men of experience, abundantly able to cope with the many problems relating to soil and water,—than which nothing is more vital to the farmers, problems which know no boundaries, State or National—such men will be raised up and come to the front as needed, for the world movement is a forward and not a retrograde.

Let us then, wherever we may be:—

"Look up and not down; look out and not in:
Look forward and not backwards, and lend a hand."

May this session of the International Irrigation Congress be a mighty uplift to the cause of Irrigation and questions kindred thereto, is the sincere hope of

Yours most sincerely,

(Signed) B. A. FOWLER.

To:—

Major Richard W. Young, President
International Irrigation Congress.

PRESIDENT YOUNG: The following letter has been received from Gov. Hunt of Arizona.

Executive Office, State House,
Phoenix, Arizona.

October 3, 1914.

My dear President Young:—

As I am unfortunately prevented from attending the Irrigation Congress in Calgary this year, I take this means of expressing to the Congress my sincere regret, while reasserting my deep interest in the work which the Congress is doing. I derive much gratification, moreover, from the fact that Arizona, with her extensive irrigation interests, will in all probability, be well represented at the Congress by appointed delegates. Permit me to assure the Congress of my most earnest wishes for a successful gathering and of my disposition to co-operate in every way possible to further the best interests of the states having irrigable lands.

Sincerely yours,

(Sgd). GEO. W. P. HUNT,
Governor of Arizona.

Mr. Richard W. Young,

President, International Irrigation Congress,
Calgary, Alberta, Canada.

PRESIDENT YOUNG; Our first item on the programme is an address by Mr. J. Bruce Walker, of Winnipeg, Manitoba, The Dominion Commissioner of Immigration, on "Nation Building in Western Canada". I have the pleasure of introducing Mr. Walker. (Applause).

Address by

J. Bruce Walker

Dominion Commissioner of Immigration

NATION BUILDING IN WESTERN CANADA

Mr. President, Ladies and Gentlemen: When I come to think of it, the title of my remarks has what might be des-

cribed as a "Highfalutin" sound. I am not in any sense a "Highfaluter." I have recognized, since I have been here, that I am coming to talk to hard-headed business men and hard-headed people, and I also decided that I would meet your wishes best and please you most by speaking in a plain way about those aspects of the business with which I am more intimately connected, and in which we are all more or less interested, and I will promise you at the outset not to weary you with too many figures, and not to talk too long. We will start off with those two agreeable thoughts. The department which I represent at the Congress and in Western Canada is charged, in general terms, with the colonization of the government lands of Western Canada and I take this early opportunity of expressing my appreciation of the very valuable, almost, I might say, invaluable services that we have received from the provincial governments of the West, and in a marked degree from the Canadian Pacific Railway Company, over whose colonization resources and natural destinies our good friend Mr. Dennis presides.

Of Mr. Dennis' Company, the Canadian Pacific Railway Company, I would say it occupies the unique position of being a corporation with a conscience. You know we are told and we believe that corporations frequently are not strong in the conscience direction, but the Canadian Pacific Railway Company was the earliest agency employed in the colonization of Western Canada, in conjunction with an old established steamship line, called the Allan Line, having its origin in the old country. These two great organizations were the first two important and effective agencies brought into existence for the peopling and colonization of Western Canada. Now I want to say one or two brief things about Canada generally from its colonization point of view, and then I want to address myself for the balance of my talk on the Western aspect of the colonization situation.

I daresay there are a large number, or a small number, of us present who know something of the population of the United States, but many of us might not be equally well versed in the population of Canada. According to the census taken in the early summer of 1911, the population of Canada was given as a little under seven and a half millions. There are some of us who think that was a conservative estimate, and there may be something in that, but we have to rely on the census for official figures. We find that is a very fractional part of the population of the country to the south of us, but we are bold enough and brazen enough to keep comparing ourselves in some respects to our big cousin on the other side of the line. Now, with a population of seven and a half millions, I am also able to say that the growth of the population in Canada for the decade immediately preceding

June, 1911, was greater than that of any other country in the world. The growth of population in the ten years preceding June, 1911, was greater than that of any other country in the world. The United States, which comes next, increased twenty-four per cent. in the ten years, whereas Canada increased thirty-four per cent. in the same period. You will be interested in having the statistics of the growth of the immediate provinces surrounding where we are now, between the years 1901 and 1911. The province of Alberta in 1901 had 73,022 inhabitants; not nearly as many as there are to-day in the City of Calgary. In 1911, it had increased to 374,663, or an increase of 413%. The neighbouring, and sister province of Saskatchewan had in 1901, 91,279 inhabitants, and it increased in 1911 to 492,432, or an increase of 439%.

The westerly province of British Columbia had, in 1901, 178,657 people, and in 1911, 392,480, or an increase of 119%, while the little province, or, as we sometimes call it, the "Postage Stamp Province" of Manitoba had, in 1901, 255,211 inhabitants, increasing in 1911 to 455,614, or an increase of 78%, so that you will see that those four provinces have made a remarkable increase in population, and it might not be uninteresting for the citizens of Calgary to know, and for us who are visiting this fine young city to know, that the city of Calgary, according to the census, showed a greater percentage of increase than any other city in the Dominion of Canada in that ten years, something like 619%; a most extraordinary increase.

Let us come to the question of immigration, which is the generic term for colonization. In the five years ending 21st of March, 1914, there entered Canada as immigrants, from all quarters of the globe, one-and-a-half millions of people, and that in a population running around seven-and-a-half millions. In the year 1913, last year, immigration to Canada reached its high water mark. It was something over four hundred and two thousand from all quarters, and I want to draw your particular attention to this interesting phenomenon and that is, that the United States with a population of ninety-four or ninety-five millions, had a gross immigration for the year round of about one million. I am, of course, just speaking in round figures, it was a little over a million. That was for some ninety-four or ninety-five millions of people, while our total immigration for seven-and-a-half million people was something over four hundred thousand, so that you will see that in proportion to the size and power of our digestive organism, we are undertaking a very important work in assimilating the vast mass of new material which we are receiving from year to year. Now of this four hundred thousand, who came to Canada last year, about fifty per cent. or two hundred thousand of them settled in the four western

provinces, that is to say in the provinces west of the Great Lakes.

It is not a parochial spirit that induces me to discriminate for the purpose of my remarks between Eastern and Western Canada, but it is because you and we are really more interested in the primal or principal industry of Western Canada, than we are in the more industrial and commercial eastern half of the Dominion of Canada. We are not doing this in the shape of a mark of discrimination in any sense, but because our western provinces come more into contact with those things which we are here to consider and which require the consideration of all those engaged in colonization work, so that we have something over two hundred thousand settling in Western Canada in the year 1913. Of those two hundred thousand, we had nearly ninety thousand Americans settling in Western Canada. That is to say there came over the line from the United States, where they had resided for a greater or a less period, some of them citizens by naturalization and some of them citizens by birth, but all of them more or less citizens of the United States, to the number of nearly ninety thousand, and settled in Western Canada.

The total number who came over from the United States to Canada in that period was, of course, a very much larger number, but we are dealing more particularly with the western provinces, and consequently I am taking the proportion who came from the United States and settled in the West, and that is something like ninety thousand. These people brought with them goods, in the form of household effects, chattels, implements, stock, cash, drafts and other securities to the value of about one thousand dollars apiece. That is our Customs and Immigration valuation of the material and things which they bring in. No Customs organization, and no Immigration organization, can ever begin to estimate the value, as an asset, that the man and his family are, but the material things amounted, on an average, to one thousand dollars per head, or nearly ninety millions of dollars in these various forms which I have described.

I am not here to offer any apology for the efforts that we have consistently, and not without some success, made to induce so many of our cousins from the United States to come and throw in their lot with us. I have been asked more than once if there was any one thing that I could adduce as being the magnetic reason which brought them over here in such large numbers, and I think it is due more to the natural business instinct and the business acumen of those people than to any blandishments of ours, and I think the reason is to be found in the fact that our American cousin knows a good thing when he sees it, and that we have the good thing.

On the other side of the account, to which I am not laying a great deal of emphasis at the present time, there is the fact that a considerable number of people leave Canada and go to the United States. The appreciation of good things is not confined solely to our American cousins. Some of our Canadian brethren have also a keen appreciation, and they go over there in very large numbers, and the happy condition exists of going backwards and forwards, and it is very doubtful if the balance of immigration is not on the American side, according to your papers. Of course, we deny that, but whatever the figures may be, here is one outstanding fact, to which I desire to draw the attention of those who think they are getting as many as we are getting, and that is this, that the records fail to show this leaving by the usual channels of egress in any considerable numbers and furthermore, the railway companies fail to prove that they collect freight for outgoing freight in any considerable amount. Therefore, I am inclined to think that a very large proportion of those who come remain with us definitely. I have known of some of these people going back, and they give us their reasons, because we are just as particular to ascertain the reasons for which a man leaves our country as we are to ascertain where a man comes from, what he is bringing, and where he is going. Our Immigration organization on the boundary line asks the most minute particulars as to a man going away from the country, just the same as when a man is entering our country. We make it our business to ascertain the reasons why he is leaving and a very great many reasons are given.

Some of these reasons are flattering to us and some of them are not very flattering to us. Some of them tell us that our country is no good and some of them say that they have got no crops since they have been here, and some of them say that they are sorry they left the Stars and Stripes, but the latest and more original reason, in my experience, given for the last year or two, was from a gentleman who came from the state of Montana to settle in the southern part of the province of Saskatchewan, the name of which I will not mention. You will appreciate my object in not doing so a little later on. He did not stay in Canada very long, and he went back to the state of Montana, and I made it my business to have an officer of ours situated in Montana call upon this gentleman and ascertain the reason for his leaving our country, so that it might be possible, if we were to blame in any way, that we might do something to prevent a recurrence of such a condition. My officer visited the gentleman in question and reported to me that he had been to see him in his home and that they told him the reason he left was because his wife did not like the society of the people in the place where they had settled. I did not ask if there was a knickerbocker four

hundred in that place in Montana where they came from and I have not mentioned the name of the place in Saskatchewan where they went to, so that I have not given any offence.

In the five years in which I have given those figures we have entered two hundred and fifteen thousand homesteads. Now I have got to hurry on because I have not much more time. As a matter of fact we have been granting homesteads and pre-emptions to new comers from all countries to the amount of about six million acres annually. I know that our conditions of homesteading are not very greatly dissimilar from the conditions obtaining on the other side of the line. As a matter of fact, a great many of the regulations governing our colonization and homestead laws have been copied from the older civilization of our cousins across the border, so that they are bound to be on somewhat similar lines. In the first place everyone of twenty-one years of age who is of sound mind can get a homestead. That is the only real qualification that we make. From my point of view, I am strongly in favour of giving it to every woman of twenty-one years of age, if they ever reach that age, and are of sound mind. He gets a homestead of 160 acres and in return for that we expect him to reside six months every year, for three years, on that homestead and to cultivate fifteen acres every year for three years and to build a habitable house.

These are all of the conditions that we ask him to fulfil, and of course, we have our officers to see that he fulfils them. Then we have a pre-emption. In certain areas of Saskatchewan and Alberta we give a man power to pre-empt 160 acres on conditions he lives on that quarter six years and performs the same duties. That gives him a farm of 320 acres practically free, except for the conditions which he has to perform. Then we have another scheme of giving what we call a purchased homestead, that is to say, a man who has not already exhausted his homestead rights, and is not in a territory where homesteads are available free, is allowed to purchase a homestead at \$3 per acre, payable over a long term of years at a small rate of interest. In return for that he has to execute certain duties. Now these are the three inducements which we offer to settlers to take up lands in our Canadian West.

How do we deal with these large numbers of people who are coming into our country? I have mentioned that in our western country last year no less than two hundred thousand people came in. Now there has to be some considerable organization to deal with such a vast concourse of people coming year after year into a comparatively sparsely populated country. We have a number of forms upon which we operate and our organization has been brought to a fairly satisfactory state of perfection. We divide the people who are coming into our western country into two classes; those

who want farms and those who want labour. Those who want labour pass through the bureau of the Dominion Government at Winnipeg. We keep continually in close touch with the Dominion Government, the provincial governments and the municipalities and the farmers to ascertain the class of men wanted, the number of men wanted and the terms of engagement, and the length of engagement.

These are all kept on record in the bureau offices and every man coming into the office passes through the bureau and, if he is looking for labour, he is handed a card upon which is the name of the person who is looking for helpers and the Post Office and the Station is given to him. Furthermore, we are enabled to issue that man a ticket at a rate from Winnipeg to his destination in any of these western provinces at the same rate as if he had booked right through from his own home town in New York, London, or Liverpool to that destination. He books at the same rate as if he had booked for that point from the very start. We engage a large number of labour superintendents to see that these men are placed and to direct them to the homes of the men they are going to. Their duty is to describe the roads and the section and the township and the range so that they may be taken to their destination as quickly as possible.



A CONGRESS OF ANIMALS.

Then again, with reference to our homesteads, all over our western country, it is divided into so many land districts. When a man goes out into the country, he goes to the nearest land district office in the district in which he happens to be at that time. There he is supplied with a plot of vacant homesteads, and, in addition to that, the Dominion Government provides, free of expense as far as he is concerned, a man familiar with the country in which they happen to be. This man charges only for the maintenance of the horses and the rig which he requires to take the prospective settler out in. He will take him and show him the vacant homesteads mentioned in the plot and will enable him to come back to the nearest sub-land office and secure his homestead. These agencies are spread broadcast all over the western provinces, so that there is no difficulty in obtaining a homestead, as far as the organization is concerned, but, of course, this fact has to be admitted, that, on account of the large numbers of settlers coming in, the available lands for homesteading have been pushed back to districts more distant from railroad stations than they were some five or six years ago. For this reason a man has to go further back from a railroad for a homestead than previously, and it is to his interest and business to see that he does not go so far back that it would not be profitable for him to bring his produce into his market.

There is the care of the people. You cannot put all of these people into this new country without having a great deal of trouble, because they are, after all, liable to all the ills that human flesh is heir to. They have their sickness and sorrows, their deaths and marriages, and they have their crimes and all other things that human flesh is heir to in our great metropolitan centres. The Government of the Dominion of Canada, the Provincial Governments, in certain lines, and the Dominion Government in broader lines make it their care and duty to see that no untoward calamity befalls the new homesteader in the new country. It sometimes happens that calamity does befall him. In a certain section of our own country at the present time calamity has befallen him in a very serious measure, through the prolonged drought. To the new settler, who perhaps did not bring a great deal with him when he came to this country, and, what he did bring, he sunk it all in his homestead and has been able to reap very little or practically no crop from it, the outlook of a Canadian winter on the prairies in that condition is far from a pleasant one and is most serious. Naturally, this new settler is anxious to know what assistance he is going to get in order to tide him over the difficulties which, by reason of the drought and through inability to obtain from the soil sufficient to keep his family, he is now in such desperate straits.

Now to the everlasting credit of the Provincial Government and to the everlasting credit of the Federal Government, they have resolved that, come what may, they will see the young homesteader through the difficulties of the winter in every respect, and word has been sent to them on the part of the Provincial Government, employment of road-making will be given them and good wages paid for it, and every assistance given to them by which they will have a chance to earn something to provide for themselves and their families. Also, along comes the Federal Government and says "Those of you who are in need of provisions, we will provide them. Those of you who are in need of feed for your stock, we will provide you with feed. Those of you who are in need of fuel will have the fuel, and those of you who have not been able to retain or obtain a sufficient supply of seed grain for next year's crop can depend upon having it supplied next year." So that the farmers in the new districts who have suffered from drought in the past year and a number of past years in a more restricted area, have the satisfaction of knowing that the Government of Canada, Provincial and Dominion, are sufficiently close to and interested in them to see that they do not suffer any serious inconvenience or injury from the failure of their crops and they are both coming forward this year with a widespread measure of support, which cannot be classed as charity. We are not giving anything away. We are simply advancing it on a lien taken on the homestead of the man who has not yet got his patent and in the case of a man who has secured his patent, he gives a promissory note, in which he undertakes to pay as soon as he can pay. No interest is charged on the first year, for the value that has been advanced to him. You will appreciate from this the fact that the government takes a deep personal interest in his personal affairs.

In the case of sickness, medical assistance is provided. If a man has not been more than three years in the country, the Federal Government undertakes to have medical assistance given him, charging him with the cost thereof, when he is able to pay, and if he is not able to pay, it is charged up to the public funds. In this way we have created a feeling of confidence and satisfaction in the minds of our settlers.

This is one of the principal reasons why we have been enabled to attract settlers in such large numbers from the distant Continent of Europe and from the United States.

I thank you very much, gentlemen, for your courtesy and attention. (Applause).

PRESIDENT YOUNG: I am sure that you feel, with the Chair, that you are glad to have heard the address of Mr. Bruce Walker. It has certainly been filled with a vast amount

of extremely interesting information to us. It goes to confirm what we of the United States have suspected, and that is that there is a breadth of legislation and statesmanlike grasp of this situation which fairly turns us green with envy in the United States.

I noted what Mr. Walker had to say about immigration from the United States, and I remembered having heard Mr. Dennis make the statement yesterday, and this comes by way of confirmation to me, and to us of the United States, that there were some 50,000 Canadians in the City of Chicago alone, so there are some who see the good things that we have. Those people who went out of the nameless place in Saskatchewan, back into Montana, I suspect live in Mr. Newman's town, and the fact is, no one can stay away from Mr. Newman for more than a year or so, without an insatiable desire to get back.

MR. GEO. ALBERT SMITH, of Utah; Mr. President, I would like to ask Mr. Walker a question. My question is: Are there no restrictions with reference to citizenship at all in the acquiring of lands in the Dominion of Canada?

MR. WALKER: There is a restriction with reference to the citizenship of those now acquiring lands in Canada, but there is none in entering for the homestead. Before a man can acquire his patent, he must become a Canadian citizen.

PRESIDENT YOUNG: Is there any further discussion? If not, we will be favoured with a solo from Miss Iris Harrison, entitled "Come, Beloved," accompanied by Mrs. W. R. Winter, (Applause).

PRESIDENT YOUNG: We will now have the pleasure of hearing from Mr. J. B. Case, of Kansas City, our First Vice-President, and a gentleman who has had the distinction of presiding as President over one of the great non-official Congresses of the United States, the Trans-Mississippi Commercial Congress. His subject is "The Landless Man and the Manless Land." Mr. Case, gentlemen. (Applause.)

Address by

J. B. Case

**First Vice-President International Irrigation Congress; Ex-President
Trans-Mississippi Commercial Congress**

THE LANDLESS MAN AND THE MANLESS LAND

Mr. President, Gentlemen of the Congress, Ladies and Gentlemen:

It might interest you to-day to say that I have just received a letter from Kansas which says that the weather continues warm.

In answer to my friend, Mr. Walker, I want to say that I fully agree with him that there were four hundred thousand people emigrated to Canada last year, and I think a large proportion of them came from Kansas.

This opportunity to greet our neighbours up here in the Canadian Northwest is one that gives me especial pleasure. The world is small and though you are separated from our western United States by long distances, you are in effect our neighbours and friends. We have watched your progress, your marvelous development and the splendid ability with which you have brought out of the wilderness a magnificent civilization. The people of Western Canada are to a large extent our own people, and we have no other wish than that for their success and prosperity. Your cities are a miracle, and the development of your farms is one of the wonders of this century.

The purpose of this gathering is that of helpfulness. If it were nothing more than a social occasion, it would be a failure. Its real reason for existence is that it is an honest attempt on the part of men of different ideas from different sections to work out a system of betterment for those who till the soil. Back of it and its real basis is the one principle that every family is entitled to enough land to sustain itself. This proposition of enough land for every family is so broad that it embraces more possibilities for happiness and free government than any other material condition.

If every soil-cultivator owned, free of debt, sufficient land on which to sustain a family, and every city workman held free title to a lot and home, there would be no spot under the heavens where discord and turmoil could plant their standards. It would be a perpetual guaranty to national stability and world peace.

LAND OWNER IS MASTER

Who is master of the soil controls the government, happiness, morals, the destiny of the people. The more citizens that have an interest in the land, the stronger the nation. It makes the citizen a partner in the government, and his title is a perpetual bond. It makes him a stock holder, his voice is guided by his vested interests. The land belongs to the people who use it, and is not to be monopolized for speculative purposes. Your country and our country need not only prosperous citizens, but good citizens. Land and liberty are closely allied, and when we preach the gospel of land ownership we are spreading the doctrine that will promote the good and the happiness of our people.

There is no joy like living beneath your own roof. Few men will fight for their neighbours, but all will fight to protect their homes. Who would fight to protect a boarding house?

The agitator is seldom the taxpayer. The naked and hungry can never make ideal citizens. The wildest anarchist becomes tame when he gets possession of property or has a bank account. The road to wholesome politics and better morals is to put the landless man on the manless land. The nearer the soil, the higher the standard of physical and political health. Fertile fields, happy homes, school houses and churches—man needs no more. Better than natural resources, better than material resources, better than climate, for these have existed here forever, better than all these is true manhood and pure womanhood such as have made the waste places of this continent blossom as the rose.

BLENDING NATIONS OF THE WEST

We have here assembled and assimilated the best blood of every race and nationality. We have gathered here the sturdy Norseman from the bleak and snow clad hills of northern Europe. We have gathered the Gaul from the vine clad hills of sunny France, the condescending Saxon willing to govern himself and all the world besides, the plaided Scotchman from the banks of Bonny Dhue, the witty sons of Erin from Killarney's loveliest lakes, the industrious Teuton, and we have blended all these elements into the grandest type of citizenship every known in the manhood and womanhood of the world. The gate ways of the west stand ajar. The invitation of the legend "all hope and none despair" is inscribed above our portals.

But I come to you to-day as a citizen of the United States, your neighbour, but nevertheless one more interested in the development of his own nation than he is of yours, and you will pardon me if I offer to those of my own country some remarks that apply especially to the needs and demands of the times in the United States of America. Many of these apply as well to you, but my familiarity through a life-time of effort in developing our own Great West gives me a keener interest in what our own future promises.

SOLVING THE WEST'S PROBLEMS

We have not yet completed the solution of the problem of the settlement of our own Great West. Under our system of government we have not always had at Washington a full appreciation of the West's needs or of its opportunities. It has been suggested many times, and this idea meets with my hearty approval, that the members of our Congress should be compelled to make an acquaintance with the West; that it be compulsory before a Congressman can occupy his seat, he shall take a course in national education, familiarizing himself with his United States. He should be obliged to visit

every commonwealth, especially where there is public land, and it should be compulsory that he be re-examined every six years and maintain his familiarity with new conditions as they arise.

We of the western United States are much pleased with the interest being taken in our section of the country by the present administration, including the Interior Department. This administration has grasped more fully than that of any previous one the needs and demands of to-day. All it requires to bring about the settlement of western land is the co-operation of Congress, and if the members of Congress understood conditions as well as do the western members of the Interior Department, we should see a speedy settlement of the West's arid lands.

COMMISSION TO MAKE PLANS

Heavy burdens are already imposed on the Interior Department. I would like to see a commission appointed of western men familiar with the growth and development of the western states, devoted to figuring out ways and means by which our western lands, now unoccupied or but scantily utilized, could be transferred to home-builders. The Canadian Northwest and Australia have done something along this line, and I do not hesitate to say that we could learn valuable lessons in land settlement from our neighbours. This investigation should include the arid lands, the lands under the Carey Act and lands controlled by the Reclamation Service. It is a big job and needs the best brains in the country to manage it.

One of our western senators, Senator Newlands, has before Congress a bill, which in my judgment would be the best investment ever made, and no more of an experiment than the Panama Canal. This bill provides for an expenditure to the west of many millions of dollars, but our western people approve of it. In the State Bankers' Association of my own state, Kansas, it was unanimously approved, and wherever it has been given careful attention, it has met with commendation of those interested in up-building the West. Millions of acres of unoccupied lands in the inter-mountain sections are now used for pasture. Immense herds of cattle and sheep feed there, owned by a few men. These should be so disposed of by the government that instead of growing cattle and sheep, we shall grow men and women, and that families may obtain a livelihood upon these now practically unoccupied areas. The mineral beneath these lands should be segregated to the benefit of the national government, and in years to come it will return a value greater than that of all the land.

FARMS ARE REAL WEALTH

Agriculture is the prime industry of our country. The chief concern of the West, whether in Canada or in the United States, should be to bring greater areas under the dominion of the plow. To that end we should work for the settlement of all the western lands. Let us subject every available inch of surface to agriculture. Let us place it under the sceptre of the farmer, under the domination of the plow and the reaping machine. The cactus should yield to the perennial wheat field. Better expend money to build homes than battleships to build ditches than graves.

The recent census of United States puts the population at one hundred and nine millions, a great and growing country devoted to every activity in agriculture, manufacturing and mining that our diversified territory permits. This population is rapidly increasing. With every added family comes an increased strain upon the ability of the nation to feed, educate and care for the new citizens. Democracy is on trial on a scale that staggers the imagination, big enough to make its failure a world catastrophe. Its success means the greatest political triumph in history hence we are eager that the best brains and the best judgment of our best men be utilized to work out a system under which there shall be happiness and prosperity for all our people.

NOTHING THE MATTER WITH U. S.

The business conditions of the United States are sound. We have just gathered the greatest grain crop in our history. Our banks are safe. There is nothing the matter with the United States. War means an unprecedented demand for supplies. While other nations destroy, our country will produce; while other nations are armed camps, ours will be a farm, a factory, a forge. The national administration is acting wisely. We are maintaining a strict neutrality. We stand for world peace and for world prosperity. The United States will adhere rigorously to this idea, and we shall welcome the day when

* * 'the battleflags are furled
In the parliament of man, the federation of the world."

A FIGHTER FOR THE WEST

Every friend of the West is my friend, every enemy of the West is my antagonist, and I am his antagonist. We seek no quarrel with any nation on the globe. In peace, friendship and fraternity we will co-operate with other nations in working out the splendid and alluring destiny of the West. We feel that you are our neighbours, and I say to you again, whether

in Canada or America, whether Democrat or Republican, whether Radical or Conservative, all friends of the West look alike to me, and whenever I can serve any section of this great rich territory that embraces the heart of the country, you are my master, I am your servant.

I trust that the highest hopes, loftiest expectations and the most entrancing dreams of this Congress may be realized in the fullest fruition of Western prosperity and Western development.

Mr. President, Ladies and Gentlemen, I thank you. (Applause).

PRESIDENT YOUNG: Those of us who have been acquainted with Mr. Case for a year or two, are not at all surprised at the thoughtful, humanitarian, patriotic paper to which we have just listened. The Newlands bill, that Mr. Case referred to, in very brief outline, is a bill that aims at taking the great rivers of the United States, in their upper reaches, and conserving them in reservoirs to accomplish several purposes. (1) The irrigation of the great slopes that go down to the Mississippi and the Missouri from the Rocky Mountains. This is also true of the Eastern Mountains: (2) To create a sufficient flow of water in our great rivers in the season of low water for successful navigation; and (3) There may be other reasons which do not occur to me—for the purpose of protecting the great region in the lower lengths of the Mississippi river and the Ohio and other tributaries, from the floods which annually harrass them.

This is a magnificent scheme, and it involves the expenditure of a vast amount of money, but still small when measured with the benefits which may be derived. We learn from the successful enterprises of our neighbours, and we may learn from the policy that dominates your Immigration Bureau, your Commissions in this Dominion, and we learn also from our own mistakes.

The subject of the next paper is "Failure of Irrigation and Land Settlement Policies of the Western States." This is an address to be delivered by Mr. D. W. Ross, Consulting Engineer for the state of California, and formerly State Engineer to the state of Idaho. I take pleasure in introducing Mr. Ross. (Applause.)

Address by

D. W. Ross

Formerly State Engineer of Idaho and Supervising Engineer United States Reclamation Service

**FAILURE OF IRRIGATION AND LAND SETTLEMENT POLICIES
OF THE WESTERN STATES**

Mr. President, Ladies and Gentlemen:

As the President has just stated, we learn many of our most valuable lessons from failures. I am afraid some of you might think from the subject of my address, as it appears on the programme, that it is my intention to drag in our failures by the ears, and air them for your benefit; but the fact is, before selecting this subject, I hesitated considerably, and I selected it with considerable misgiving in my own mind as to the propriety of discussing it, especially beyond the borders of my own country; yet, I cannot help but think that you here, are only at the beginning of great things.

I think we can all see evidence of that, not only in this city in general, but in this hall, on account of the extent and great diversity of your products. It is also quite evident that irrigation will become one of your great agencies, and one of the great means of diversification, and the means which will give you sound basis for your agriculture. You are doing your pioneering in the building up of institutions, approaching the subject from a slightly different angle from the line which we have followed, and it is hoped that you may avoid many different mistakes by observing the policies which we have been following for the last twelve years. We are just now learning our most valuable lesson. Unfortunately we do not learn very many lessons from successes, but from failures, and it is for that reason that I chose the subject of failures.

It is a long jump from orange blossoms to snow drifts. I rather expected to find the air a little crisp in Calgary, because I was here many years ago in the early part of October, in the '80's, and it was quite crisp in the mornings; but we would naturally expect to find many things that would be suggestive of the great difference in climates. I was much interested this morning in my wanderings through the back of the hall, when I came across an exhibit from a section of the country with which I was quite familiar in the early '80's—the Battleford section. I was wondering, while I was listening to the very interesting remarks of Mr. Walker, if you have gone any further north than Battleford. I observed some of the finest alfalfa that I ever saw in any country, and I went

back after lunch to examine several bunches, and I noticed they all bore the record that they had been seeded in June of this year, and the gentlemen in charge told me they were cutting $4\frac{1}{2}$ tons to the acre from 2 cuttings, almost as good as we get in Idaho and Nevada, and more tons to the acre than we get in southern California. As far as I can observe, they are just about the same products, beginning down at the Gulf and travelling north, as I say, as far as Battleford. I saw some fine exhibits in New Orleans, and they looked very much like these, and I think you could make a very creditable showing if you sent the vegetables which you raise at Battleford to an exhibition at New Orleans, and I can readily understand why you are getting 90,000 people from the United States, and most of those people farmers.

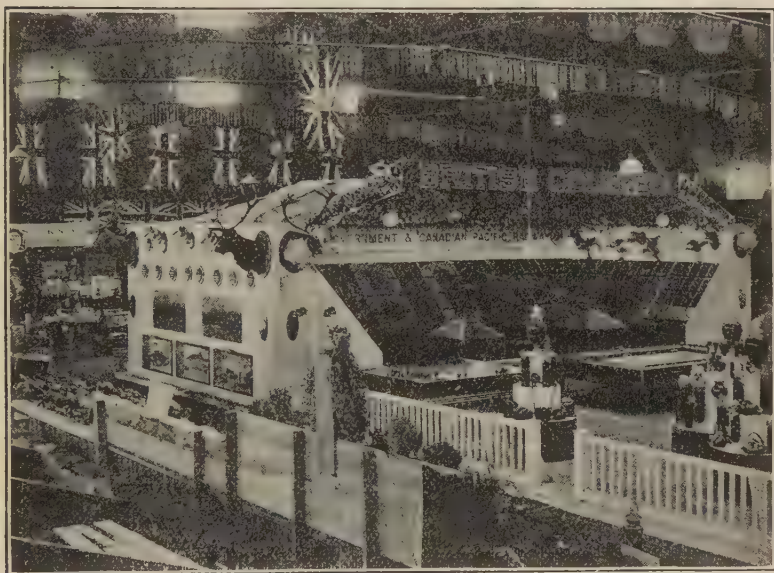
I will be short of time, as my paper is rather long, so I will not attempt to pay you any more compliments, but I would like to take the time to tell you how pleased I am and how much I appreciate the wonderful work you have been doing in these North-western Provinces. We have been driving a head with our irrigation development work, and on the surface of things it might appear to you, through practically the same agencies as you have employed in the Northwest Provinces. The states have been engaged in irrigation development indirectly, through the agencies of corporations and companies, chiefly under a Federal law, known as the Carey Act.

The Federal Government began the work of irrigation development in 1903. Since that time, about 30 projects have been inaugurated, and many of them carried to completion, and about \$80,000,000 has been expended on this work. During the past 12 years a large number of projects have been inaugurated by the states under the Carey Act, and the purpose of my paper is to outline to you the policies in general which have been pursued by the states, nearly all of them having pursued the same general policies, and the results of these policies and a line of policies which are suggested as being believed to remedy some of the defects and difficulties and perhaps restore the confidence of the public.

It is a long jump from the orange groves and vineyards of my own state, California, to the wheat fields of Alberta and Saskatchewan; from the December roses of San Diego and Berkeley to the snow drifts of this northern land. We can, however, easily over-value the luxuries of the gardens and groves of the South; they could all be dispensed with and not cause great privation; but much of the world is now depending upon you for the very staff of life itself. Besides, what your climate may for a short season of the year lack in warmth is more than compensated by the spirit of hospitality which you extend to the stranger in the manner peculiarly characteristic

of the people of the western half of the continent and which in spite of an international boundary makes our kinship a double one.

The splendid agricultural exhibits at the other end of this great hall are of especial interest and significance to me at this time, for back in the early '80's, before there was any settlement or agriculture in these regions, I travelled over a portion of the country now occupied by your most northerly settlements. I have been looking for something in these exhibits that would suggest those limitations which climate fixes but can find nothing to indicate that your agriculture has reached the "farthest north;" nor do I believe you will reach such limit



BRITISH COLUMBIA EXHIBIT.

for many, many years to come. I predict that this magnificent exhibit, which we all hope to see at the Panama Pacific Exposition next year, will favourably compare with, yes, will excel many similar exhibits of agricultural products grown a thousand miles south of the forty-ninth parallel.

Your agriculture is but a few years old and the giant strides it has been making are only its first infant steps. What its future will be when full advantage is taken of your millions of acres of free lands under the fostering care of governments which are earnestly promoting the success of their farmers, is left to the imagination. I believe that for many years to

come it will be the height of folly to ignore this factor, namely: the great agricultural possibilities of these provinces, when considering plans and policies relating to immigration, land development and redistribution of population at other point on this continent.

It was indeed a happy inspiration that prompted those in authority to hold the Congress at this new centre of great activities. The Irrigation Congress has always been international in its interest but for the first time in its existence its meeting is held outside the borders of the United States. The people of Canada, especially of the western provinces, have never been lacking in interest in these meetings having many times been represented by experts from whose messages much has been learned. So it was very proper and fitting that a session be held in this Dominion, if for no other reason than the opportunity afforded for the return by us of a courtesy which has long been overdue. But there are other reasons why this selection is fitting, in fact, fortunate at this particular time. This is the 21st meeting of the Congress. It has reached its majority—man's estate—and should therefore go abroad and mingle with the world, where it may perhaps learn many things of great value.

We Americans, as we call ourselves, for you are of course aware that the continent was named after us, go about things in our own peculiar way. We are not a people of thrift. Indeed no, we have not come to *that*—some day perhaps—but there is plenty of time for the practice of that homely virtue. We still have plenty of vacant land, mostly mountains and deserts and swamps it is true, and we have the people for these lands: our "landless man" whom we write about and who is in our cities millions strong. We have been telling you all about him for years; how we propose some day to bring him to these "manless lands" but plans for that purpose can as yet only be found between the covers of our magazines. We cannot claim thrift as a national virtue but I am afraid drifting is one of our characteristics. The expression of this characteristic is best found in some of our public policies. We "start things" or rather, we allow the citizen to "start things" and the freedom of action in this direction which has been accorded the citizen has always been our boast; but, after things have been well started, we allow matters to drift along without public attention until it frequently requires all the statesmanship, power and resources of government to correct the evil effect of the forces which have at times been set to work in opposition to the best interests of the public.

You Canadians have been more conservative in your public policies. You have made government serve the people and have also realized that service could best be rendered by the citizen, when acting as agent, when he is held to a strict

accounting from the very inception of his stewardship for any act which the government may have authorized; besides, your government has done much of the starting of things itself and has carefully directed and paved the way for the current of those events, the source of which has been its own acts, thus keeping under control and well in hand the forces which are so prone to work at cross purposes if neglected.

The Irrigation Congress was born for a purpose and it was asserted years ago by many who have been interested in its doings that that purpose had been fully accomplished when the Congress of the United States was induced to pass the National Irrigation Law and when the states of the West enacted better irrigation laws and committed themselves to the work of irrigation development. Many of our people have always thought of irrigation development as the mere building of canals, dams and reservoirs. This is largely the work of the engineer, but is only the means to the end sought, which is the successful settlement and cultivation of the land. Our country has never had a land settlement policy. The government is now proceeding with the work of reclaiming its desert lands, devoting attention chiefly to the engineering problems involved; the settlement of the lands being mainly left to the tender mercies of the law of the survival of the fittest. As a matter of fact the real problems of irrigation *begin and end with the successful settling of the land*. While you have wisely been profiting by the mistakes made across your border, you have lately, however, been blazing some important trails which we of the Western States could well afford to examine. Like our cousins of the Australian and New Zealand Commonwealths, you and your agents, the railroads, have devoted much attention to the real question of land settlement, not the mere allotting of your domain, but the more important problem of settling upon the land the class of people who are most likely to succeed; and, by rendering assistance of a material nature, minimizing the failures of the pioneer period of their efforts to the end that your lands may be held by a prosperous and contented people and that this condition may be brought about with as little waste of time and human effort as possible.

This Congress has been a powerful factor in securing the enactment of beneficent irrigation laws both State and National but laws which have thus far provided for the doing of but little more than this engineering work. The great problem of land settlement is still unsolved, in fact, has scarcely been considered by the American public. I believe the time has arrived when this organization should direct its best thought and energies to the solution of this question. I am strongly in hopes, therefore, that the opportunity which we now have of listening to and mingling with our good neighbours will inspire the Congress to make the important subject of land settlement the main purpose of its future.

It is conservatively estimated that more than \$160,000,000 have within the past twelve years been spent in the construction of dams, canals and reservoirs for the irrigation of desert lands of the West. The area involved amounts to nearly 7,000,000 acres capable of supporting more than 3,000,000



BRITISH COLUMBIA EXHIBIT.

people. This great work; the reclamation and settlement of these desert lands, constitutes a new and very interesting chapter in the history of western development and has brought

into relief many weaknesses in the land policies which for years have been pursued by the Federal and State governments. The human problems resulting from these policies have always been closely associated with the pioneer period of land settlement in this country and have come to be considered as necessary features of the first years of western life. In view, however, of the serious financial obligations which have become a necessary part of the great work of land reclamation, the more careful study of this period of transition with its waste of energy, life and money is now imperative. A practical plan for the return of the vast sums which have been spent for the development of these lands has not yet been devised. Nor has a plan been devised which would insure a reasonable degree of success to the pioneer settler and relieve him from many needless hardships and disappointments which have, in so many cases marked the first years of his experience on these lands. The further extension of the important work of land development and its success depend upon the satisfactory solution of these serious problems which now confront most of the irrigation states of the West.

As a rule this subject has been given general publicity by popular writers who have only seen and considered the possibilities presented by the consummation of great plans and to whom the birth of great undertakings, and the transformation from desert to prosperous farms add but another chapter to the romance of western development; but to those who have invested their money in these enterprises, the failures of the past few years have meant great disappointment and loss and to many of the settlers on these lands the wasting of the best years of their lives. Settlers on the public domain have been left so largely to their own devices that business men, especially eastern financiers, have not thought of the failures of the pioneers under our irrigation projects as one of the principal contributing causes of the failure of the undertakings themselves. The solution of the economic problems which the State and the investor are now confronting will also be the solution of the settlers pioneer problems. There is practically no more free, agricultural land in this country, so the demand for the irrigable land of the inter-mountain section of the United States will steadily increase and attempts will be made from time to time to revive the interest of the investor in the building of irrigation works. The importance of this now looms large involving as it does the Federal and a dozen state governments, but the methods which have been tried for the past twelve years have been found wanting and must be changed for more conservative and statesman-like plans if the work is to continue without doing further violence to sound business principles, to say nothing of the honour and credit of several of the states now involved.

IRRIGATION THROUGH FEDERAL AND STATE AGENCIES

For years dreamers saw visions, public spirited citizens gave much of their valuable time and commercial bodies passed many resolutions addressed to Congress pointing to the possibilities of empire building in our arid wastes, the vast stretches of country only fit, as nature had left them, to hold more desirable parts of the earth together. After years of agitation and discussion Congress enacted what was considered a very statesman-like measure which authorized the government to engage in the work of constructing canals, dams and reservoirs for the purpose of reclaiming, by means of irrigation, the arid and semi-arid lands of its domain. This work has been in progress for more than twelve years. Thirty projects containing a total area of nearly 3,000,000 acres have been wholly or partly constructed; more than \$80,000,000 has been expended to date and about 1,200,000 acres of land has been provided with water for irrigation at an average cost of about \$50 per acre. There has been much publicity, plenty of hard work, some criticism—most of it without good reason—no scandal and much good engineering, some of the finest irrigation works having been constructed that will be found in this or any other country. The lands which are being irrigated, are nearly all owned or controlled by as good a class of settlers as could under the circumstances be expected, so who with good reason could say that the ideals of those who framed this law have not been fully realized?

As a first step in the direction of state and Federal action in the actual work of desert land reclamation, Congress in 1894 enacted a measure which was designed to aid the public land states in the reclamation of their desert lands and the settlement, cultivation and sale of the same in small tracts to actual settlers, the Secretary of the Interior being authorized to segregate from the public domain at the instance of the state, reclaimable desert lands in an amount not to exceed 1,000,000 acres for each state, the same to be reclaimed by and under the direction of the state. This act is known as the Carey Act and it confers upon the states which have accepted its provisions large powers; and the laws passed by several of the states supplementary thereto confer upon their officers full authority for carrying out its purposes. Full advantage was not immediately taken of the opportunities thus presented nor was the authority placed in the hands of state officials turned to the best account. Up to the time of the passage of the Reclamation Law, segregations for only a few projects had been asked for by the states and actual work had advanced only to a point where it became quite evident that most of such projects would likely fail.

During the debates in Congress on the Newlands bill, or the Reclamation Law as it is now called, it was urged that

irrigation development in this country had reached a point beyond which it would be very difficult, if not impossible, to proceed through the then existing agencies; that in the further extension of irrigation it would be necessary to construct engineering works of such magnitude and solve economical and human problems of such importance that private capital with its proverbial timidity and caution, could not be induced to advance any farther; that the state would not assume the risks and that communities could not command the necessary credit; and therefore only the national government could afford to take the chances which this important and necessary work involved.

The experiences of the past ten years have not, however, justified these assertions. Several states, communities and corporations, inspired no doubt by the example set by the Reclamation Service, have launched land development plans which for magnitude and comprehensiveness of design and purpose, easily rank with many of the greatest projects of the Federal Government. The states did not lack interest; communities showed great initiative, while capital entered the field with a daring which bordered recklessness. Since the passage of the Reclamation Act, almost if not quite as much money from private sources has been expended in irrigation development as has been furnished for that purpose by the government, and while the works as a rule have not involved as many great engineering features, the area for which irrigation has been provided is much greater than has been developed by the government. So for the past twelve years, we have had working side by side in this field all the agencies which have to date been devised for the purpose; all having similar objects in view; all working with a free rein and, with but few exceptions, all liberally provided with money which, as a general rule, has been wisely expended at least from an engineering standpoint and, through the activity of these agencies, the valleys and plains of the inter-mountain regions have in their turn become the scene of that world-old drama; the struggle on the firing line of advancing civilization.

Although the ponderous machinery of government has been in motion for several years; although Presidents have in many ways shown their lively interest in this work and Congress has ever been ready to make the laws more perfect; although a well organized bureau has had a corps of trained experts in the field to study the needs of the settler and help to solve his problems; although states have accepted the terms of Federal legislation and have carried to completion many great projects which fairly rival similar works of the government and have enacted laws and devised rules which it was hoped would protect the settler; although capital has generously responded to the recommendation of the engineer by pro-

viding ample means for the construction of permanent works, also furnishing experts to solve the settler's problems; notwithstanding all this public interest and attention it must be admitted that as a general rule the progress made by the settler on these projects has been disappointing; his complaints have been many while most of his troubles have been real and serious and the history of the past fifty years of land settlement in the West has been repeating itself even under these seemingly favourable auspices because here, as under ruder conditions, two to three sets of settlers struggle and fail before the lands are successfully developed. It is also a lamentable fact that with only a few exceptions, the projects on which so much money and splendid effort have been expended by the agencies referred to have been financial failures. Even the government projects could not be claimed to promise a financial success. While the act recently passed by Congress extending the period of payment will afford relief to the settlers and likely insure the return to the government of the amount expended by it for the construction of the works; notwithstanding this, the present plan could hardly be regarded as a sound basis for a nation-wide policy of public construction and ownership of great utilities. The most serious failures have, however, resulted in connection with the efforts of the states, and the causes of such failures and plans designed to prevent continuation of the same are the subjects of this discussion.

FAILURES UNDER THE CAREY ACT

The success of a land development project is only possible through the proper relation of two principal factors: capital, and the owner or user of the land after it has been developed. Capital, if public funds are used, is enlisted with the promise that it will be returned or at least that interest will be paid for its use. If furnished as an investment it must be returned with interest and profit. The land owner is either a direct party to such promise or must indirectly assume the obligation. During the past 15 years many millions of dollars have been furnished by individuals for the construction of irrigation works in the West. Most of this money has been wisely expended and settlers are now on the lands, or will go upon them and will ultimately receive the full benefit of such expenditures; but much of this money has been lost to the investor and but little of it will be returned to him even with a fair rate of interest. This has occurred under state laws and direct supervision of the states, so the states themselves must be held immediately responsible for these results.

During this period must of the arid land states have accepted the provisions of the Congressional Act referred to,

and there have to date been inaugurated in such states more than 140 Carey Act projects. Of these more than 60 have been advanced to the construction stage and more than 1,000,000 acres have been entered by actual or intending settlers. These projects, when completed, will irrigate more than 4,000,000 acres of land. The cost of the works necessary for the reclamation of this area will probably amount to \$120,000,000 to \$150,000,000. The published reports of the State Land Boards do not all state the amount which has been spent to date on these undertakings but it could safely be estimated at \$35,000,000 to \$40,000,000.

A few of these projects have been notable successes; the others have failed. They have not only failed financially but most of them have failed to afford the settler the opportunities which the development of these new lands should have insured for him when we consider that such work has been done under the auspices of sovereign states with the co-operation of the Federal Government. Because of these general failures, all work is now at a standstill throughout the West nor will it likely be resumed until a plan is devised which will restore the confidence of the investing public. Most of the states which have launched these enterprises frankly confess in their official reports that their efforts in this direction have been disappointing, but none of them suggest a practical plan for rehabilitating such projects as have failed nor one which would restore confidence and permit a continuation of this development.

Lack of foresight and experience on the part of state officials are perhaps largely responsible for public policies that have turned out so badly. It was quite natural, perhaps, that the states should have adopted a plan for securing settlers for the lands of these projects similar to the plan which has been followed by the Federal Government for fifty years past: the plan of "first-come, first-served," generous enough for the mere allotment of free, agricultural lands but not a sound basis for successful financing or colonizing. It is true that hundreds of thousands of our citizens have taken possession of their share of our common heritage under this plan and have succeeded. It is also true that almost as many have failed in their honest efforts to make profitable use of these free lands. These failures are not considered matters of great public concern when no one but the settler and his family is involved in them, but when failures on these free lands have amounted to 50 to 100 per cent. of the number of original entrymen, how important is it that the state *should wisely select the settler who is to be placed in possession of land which has been offered as a pledge for the return of money spent for its development.*

PRESENT POLICIES OF THE CAREY ACT STATES AND THEIR EFFECT

In general, the Congressional Act known as the Carey Act which authorizes the state to engage in the work of reclaiming portions of the public domain by irrigation, confers upon the state large powers, giving it the right to create a lien against the land for which irrigation facilities have been provided in order to insure the return of the money expended for such purpose. The state is left free to employ any means it may decide for carrying into effect this provision of the law.

The acts of the state legislatures accepting the provisions of the Federal Carey Act deal mainly with the receiving of proposals, the letting of contracts, the opening of lands, fixing qualifications of entrymen and provisions for residence and final proof, establishing relations between the entryman and the contractor or construction company, the terms of the lien to be established and provisions for foreclosing the same. The law is careful to announce that in initiating and conducting these undertakings the state shall assume absolutely no financial responsibility. It however, clothes state officers with large discretion and authority giving them practically a free hand in establishing policies which govern their dealings with those who may engage in the actual work of financing and constructing these undertakings.

STATE LAND BOARDS

The administration of the Carey Act has usually been left to the State Land Board, a body consisting of several elective officers. These officers are not selected because of any qualification which could especially equip them for this important work.

The indifference or incompetency of many of the state's representatives who have been in charge of these matters is claimed by many investors to be one of the principal causes of the failure of these undertakings. This has also been pointed to and most severely criticised in recent reports of officers of several of these states. As this work has advanced, problems have multiplied and the general situation has become more and more complex and the changing of the personnel of state Boards every two years has left the state less able to cope with these matters to-day than it was ten to fifteen years ago. The states have either not been able or have been unwilling to organize a department of experts to have charge of these important matters.

In order that such work may be intelligently administered, a non-partisan commission should be appointed; and, in order to insure a continuity of policy, the term of such appointment should be not less than six years.

REVISION OF IRRIGATION LAWS

Most of the irrigation states have, during the last few years, revised their irrigation laws and in so doing have adopted well tried and up-to-date systems for inaugurating and establishing water rights and administering streams, and the courts have, as a rule, upheld the full intent of such laws, until the lines of decisions which are now well established can be pointed to with satisfaction and pride. Nearly all the Carey Act states have organized a department of engineering which is expected to pass upon the questions of water supply and feasibility of irrigation plans which may be presented to the state and to have immediate supervision of the construction of any works proposed.

WORK LEFT TO PRIVATE AGENCIES

Of the states which have accepted the provisions of the Act, none elected to assume the responsibility of doing such work directly, but all decided to work through private agencies. Although the future of most, if not all, of the intermountain states mainly depends upon the development of their agriculture, which can only be done by means of irrigation, few of such states have gone so far even as to ascertain, at first hand, the extent of the irrigation possibilities possessed by them, but have left the determination of this most important matter to the initiative of promoters. Most of the states have shown a willingness to apply for the segregation of lands at the promoter's instance without any particular regard for his financial responsibility or, in fact, his responsibility in other directions. The promoter undertakes to interest the capital necessary to carry out his plans and to this end usually organizes a promotion company which bears the preliminary expenses of the venture. Frequently the resources even for this purpose are not very adequate so the project is frequently launched with insufficient data relative to cost, and plans are more or less indefinite as to the important engineering feature. Sometimes these defects are later on remedied, if the promotion company is fortunate enough to secure adequate means for the prosecution of the work. In many cases, the State Board, having been anxious to make a record for itself, has openly encouraged the inauguration of work when it was well known that the full amount of capital had not been raised for the purpose. As a rule the promotion company has not only made surveys and prepared plans and specifications for the work, but has dictated the terms of the contract to be entered into by the state, the claim being made that capital would only undertake such work on its own terms. The State Board has justified its acquiescence to this suggestion by reason of the fact that the state, being unwilling to assume any financial responsibility for the outcome of such undertakings, was not

in a position to drive hard bargains with the investor, who would be obliged to assume all the risks which would be involved.

RESPONSIBILITY OF CONTRACTOR

Competitive bids are not invited by the state for the construction of irrigation works under this act, the usual practice being for the state to accept the proposal of a promotion company, which is in too many cases without financial responsibility. This proposal is frequently accepted before even the approximate cost of such work is known, estimates of such cost having in many cases been little better than guesses. Rarely has the cost of construction and other expenses been less than the price of water rights which had previously been fixed by contract with the state.

The contract with the state provides that the irrigation system shall be constructed to the satisfaction of the state engineer but because of threatened losses it has been a difficult matter to keep the work up to a high standard, and in several notable cases the contractor has strongly objected to the state exercising its authority in this respect, and it is probably only because of the bitter opposition of settlers that the state has rejected much defective work.

The state should change its policy with regard to the letting of contracts by ascertaining at first hand the cost of construction, then adding the necessary interest and carrying charges and reasonable profits, and letting the contract at the price thus established to the *most responsible bidder*, instead of to any "Tom, Dick or Harry" who might be able to file the nominal bond which in many cases has been the test of financial responsibility.

FINANCIAL PLAN AND PROFITS OF CONTRACTOR

The profits of the contractor or builder of works is the difference between the actual cost of construction and the price at which the water rights may be sold to the settlers. The payment for such water rights is secured by a lien against the land which has been reclaimed, such lien being authorized by the Act of Congress. To the security which this lien affords has been added the personal credit of the contractor.

The financial plan of the contractor which received the approval of the state did not, as a rule, take into account the non-productive period which begins with the inauguration of the work of construction and only ends when enough land is under cultivation so installments can be earned by the use of the same. This period has frequently been from four to ten years. In some notable cases, the bonds issued by the construction companies began maturing during the construction period. These maturities were met by issuing more bonds

when possible, the interest being by this means compounded. The interest accruing during this non-productive period has frequently amounted to 50 per cent. of the actual cost of construction. In a large number of cases, the construction company failed to adequately provide in its estimate for this interest account.

The most notable failures have occurred when members of Boards permitted themselves to be influenced by banker-promoters; being led to believe that the judgment of men who occupied a commanding position financially was to be especially respected in matters of this kind, accepting without question the financial plans proposed, making no examination of the real nature or standing of the organization which was to be brought into existence for the purpose, but being willing to accept personal credit or promises instead of demanding that tangible assets be kept back of securities which were later on peddled from one side of the country to the other.

The state itself should take full charge of all financing. This it could do without pledging its own credit but by using to better advantage the authority which Congress has conferred upon it by pledging at first hand the lands as they are reclaimed, and to this end it should issue the bonds on which the necessary financing may be based.

ALLOTMENT OF LANDS BY THE STATE

As a rule the state has paid little or no attention to the qualifications of entrymen but has left this matter almost entirely in the hands of the promoter or contractor. The result of this lack of interest in many notable cases has been that a large percentage of the land of projects, from 40 to 60 per cent at times, has passed into the hands of speculators who have not made profitable use of it, but many of such have used their influence in opposition to the interests of the bona-fide settler and the investor, which has contributed largely to the failure of some very promising undertakings. The law of most of the states provides that "immediately upon the withdrawal of any lands for the state by the Department of the Interior, and the inauguration of work by the contractor, it shall be the duty of the Board to give notice that such land or any part thereof . . . is open for settlement, the price at which said land will be sold to the settlers by the state and the contract price at which settlers can purchase water rights or shares in such works." Some of the states adopted the policy of with-holding the opening of land until construction had advanced to a point where water could be delivered for irrigation. Other states have frequently been induced to declare an opening of land almost immediately after the inauguration of construction, the practice being to widely advertise these "openings" and make them as spectacular as possible.

Many projects have failed after a large percentage of the land had been placed in the hands of entrymen, sometimes actual settlers, without being able to complete the works and deliver water. The law of all the states provides that anyone who may be qualified may enter land in an amount not to exceed 160 acres, provided a contract shall have first been entered into with the contractor for the purchase of a water right under terms specified in the contract between the state and the contractor. The initial payment made at the time of entering the land has usually been merely nominal. Provision is made for making final proof on these claims on or before three years from the date on which water becomes available for their irrigation. In the meantime proof of cultivation is offered at the end of each year, the claimant being required to have in cultivation the first year $\frac{1}{16}$ part of the land held by him; $\frac{1}{8}$ at the end of the second year and $\frac{1}{2}$ at the time of making final proof. Final proof is accepted in most states if it can be shown the claimant has resided upon his land for a period of thirty days prior to the date of proof.

The small payment at time of entry and the nominal requirements in the matter of cultivation and residence upon which the right to a patent is based have encouraged the wildest kind of speculation in these lands. More failures have resulted from this than from any other cause.

The policy which has heretofore been pursued by most of the states with regard to the allotment of the land should be entirely reversed. No one should be permitted to enter these lands unless he can clearly establish the fact that he will be able to discharge the obligation which he is desirous of assuming; and residence upon the land should immediately follow the first delivery of water and should be continuous until patent is issued; and at least 75% of the land that can be irrigated should be in cultivation by that time. Instead of the merely nominal cash payment now required at the time of entry, a substantial payment should be made, which payment should be held by the state itself as a guarantee of the payment of the bonds. A large payment at the time of entry will insure the land being entered by those who are best able to use it and who intend to put it to the proper use, while the fund which will be created by the payment of this substantial amount will serve to protect the settler as well as the investor. The assignment of rights should not be permitted except to the state itself.

IN GENERAL

These failures can be ascribed to three principal causes—
(1) The state's policy governing the allotment of the land; because of lack of sound judgment and oversight in making land allotments a large percentage of the land which has been pledged for the return of the cost of the works with interest

and profit has passed into the hands of speculators or impecunious entrymen, the former having no intention of cultivating such land; the latter totally unable financially to promptly put it to the use intended.

(2) The financial plans of the contractor: the actual cost of construction has greatly exceeded the contractor's estimate on which his proposal was based. Besides, he has failed to take into account the heavy interest charge which has to be met during the construction and non-productive period. He also exercised but little, if any, control over the settlement of the land, and frequently was largely responsible for much of the speculation. In making the necessary financial arrangement for carrying on this work he has generally had nothing to offer but his personal credit and a mortgage on his contract with the state.

(3) The incompetence of members of Land Boards to deal with the problems growing out of this work; This incompetence is chiefly due to lack of knowledge of the subject; and, because of the short tenure of office, they have not been afforded an opportunity of acquiring the much needed experience or becoming acquainted with the history and details of projects which lately have been rapidly increasing in number.

A PLAN DESIGNED TO CORRECT EXISTING EVILS AND PREVENT THEIR RECURRENCE

The following is an outline of an organization and a line of policy which it is believed would, if adopted by the Carey Act states, serve as a safe basis for continuing this work; and, with the co-operation of the settlers already on the lands could be adapted to existing conditions and serve as a means of rehabilitating many of the projects which are now greatly embarrassed. It is also believed that the adoption of some such plan would restore the confidence of investors to the extent of enabling the states to resume this most important work.

IRRIGATION COMMISSION

The state should be represented by an Irrigation Commission of five, including the Governor and State Engineer, who would be ex-officio members; the other three to be appointed by the Governor, the first appointment to be for terms of two, four and six years each; their successors for terms of six years. These three men should be selected for their knowledge of matters relating to practical irrigation engineering, colonization and finance. This commission should represent the state in all matters pertaining to the construction of Carey Act work. It should have power to create irrigation districts where such districts comprise lands to be reclaimed and it should be empowered to issue bonds against the lands of such

districts; such bonds to constitute a first lien against such lands, and it should have the right to levy assessments against such lands for the payment of such bonds.

INVESTIGATIONS

The state through this commission should make all investigations and surveys to determine the feasibility of irrigating any public lands within its boundary, and if it should be decided that the irrigation of any such land is feasible, it should make application to the Secretary of the Interior for the segregation of the same, such application to be made in behalf of the state only. When such segregation is made the state



C. P. R. SUPPLY FARM EXHIBIT.

should prosecute its investigation in detail, ascertaining the cost of constructing the necessary irrigation works and should make plans for all the important engineering features of the same.

IRRIGATION DISTRICTS

When the limits of a project have been clearly defined, the commission should issue an order providing for the creation of an irrigation district, such district to embrace all the lands of the project and it should divide the lands of such project into farm units, such units to vary in area from 10 to 160 acres, and it should make an equitable distribution of the estimated cost

of the works to be constructed to such farm units on the basis of the benefits which would attach to each of such units from such construction; the estimated cost of such works to be the actual cost plus such profits as in the judgment of the commission would be deemed reasonable to allow to the contractor or builder of the same.

DISTRICT BONDS

At a proper time during the progress of the work the commission should issue bonds, which should bear interest at the rate of six percent. per annum, to run for a period of twenty years, maturities beginning the eleventh year, and to be secured by a first lien against all the lands of such district. Such bonds would be issued from time to time as the lands to be reclaimed are declared open for allotment, but no land should be declared open for allotment until water is available for its irrigation.

CONTRACTOR

As soon as the commission has determined the cost of the works and passed the necessary orders defining the boundaries of the district to be created and the amount of bonds to be issued, which amount should be equal to such cost, it should invite proposals for the construction of the necessary work in accordance with plans and specifications for the same. This proposal should be submitted at the price and in accordance with the terms to be established by the commission, and the contract for the construction of such works *should be awarded to the most responsible bidder*. The contract should provide for the construction of a complete irrigation system, so that water may be delivered to such farm unit. The work would be done under the supervision of the engineers of the state.

PAYMENT OF CONTRACTOR

Payment would be made by the state from time to time for such work, the contractor receiving in such payment the district bonds at their par value, which bonds would be issued by the commission, but no bonds should be issued against such district until water could be conveyed to one-fifth the area of the district to be reclaimed, and the amount of bonds which should then be issued and paid to such contractor should be a proportional part of the whole issue of bonds in the proportion that the area of land, which at the time of such issue has been reclaimed, bears to the total area of the district to be reclaimed. Many of the states have on hand large amounts of money which is loaned on real estate. Some of this money would doubtless be available at times for the purchase of these bonds.

The contractor should furnish a bond, to be approved by the commission, in an amount equal to at least 30 per cent. of the estimated volume of his contract, such bond to be con-

ditioned upon the faithful performance of the work, in accordance with plans and specifications, and also upon the payment by such contractor of any assessments which might be payable on land to which water could not be delivered through the fault of such contractor.

ORDER OF WORK

The construction work should be prosecuted in a regular order, beginning at the upper end of the project, all main canals, laterals and structures of every kind being completed so that water might be delivered to each farm unit, and as soon as water is available for the irrigation of one-fifth of the land of the project, or a less proportion if the commission in its discretion should decide, the portion of the irrigated system thus completed should be accepted by such commission.

ALLOTMENT OF FARM UNITS

From time to time as the construction is completed, the commission should declare portions of the land of the project open for entry, such entries to be made in accordance with the farm unit plans to be prepared by the commission. Any qualified entryman should be permitted to make application for the allotment of *one farm unit only*, provided, however, that such applicant should satisfy the commission and the contractor of his ability to discharge the financial obligation which he assumes by entering such land, and such application should be accepted with the distinct understanding on the part of the applicant, that such farm unit allotment will be held by him always subject to the approval of the commission until patent is issued to him by the state. The applicant should pay to the commission in cash at the time of presenting his application to enter such farm unit *not less than ten per cent. nor more than twenty per cent. of the reclamation charge which may have been made against such farm unit*, this amount to be placed by the commission in a fund to be known as a bond guarantee fund.

Within six months after the approval of the application for a farm allotment, the applicant should assume actual residence upon his land, such residence to be bona-fide and continuous until patent is issued for the same and he should begin the work of preparing such land for cultivation and should put into actual cultivation and irrigation one-third the irrigable area of such farm unit during the first irrigating season after the date of such entry and three-fourths of such area during the second irrigating season. Three years after the date of approval of application for entry a patent should be issued by the state for such land, provided, however, that three-fourths of the irrigable area of the land embraced in such farm unit shall be under actual irrigation and cultivation.

The holders of farm unit allotments should make annual payments to the commission, which would include bond assessments and maintenance and operating charges that would be levied by the commission, the amount levied on account of maintenance during the progress of construction to be paid by the commission to the contractor as a partial consideration due him on his contract, it being understood that the contractor would maintain and operate the system until the completion of the same.

RE-ALLOTMENT OF FARM UNITS

No farm unit should be assigned, but if for any reason satisfactory to the commission the holder of a farm unit should be obliged to relinquish or abandon the same before being entitled to a patent, the commission might accept a relinquishment of such allotment and cause to be made an appraisal of the value of the improvements, if any, which may have been placed upon the land by such holder and should, after due public notice, re-allot such farm unit to the *highest bidder* for the same, such bidder to be a qualified entryman and in other ways acceptable. The amount of the bonus bid should be paid to the commission in cash in addition to the regular cash payment which would be made; and, after paying to the original holder of such unit from such amount, if insufficient, the appraised value of his improvements and the original cash payment paid by him, the balance if any, should be placed by the commission in the bond guarantee fund. The commission should promptly cancel all land allotments when the assessments against the same are unpaid. When a farm unit is allotted against which a bond assessment has been levied and advanced by the commission from the guarantee fund, the amount thus advanced should be paid by such entrymen in addition to the regular cash payment required.

BOND GUARANTEE FUND

All cash payments made by applicants for farm units at the time of their allotment and all bonuses paid at the time of the re-entry of any such allotments should be placed by the commission in a fund to be known as a bond guarantee fund. The commission should pay from this fund the assessments made against any farm unit which may be unpaid before such unit has been originally allotted or can be re-allotted.

ELECTION OF DISTRICT DIRECTORS

As soon as the irrigation system is completed the commission should call an election, and the holders of farm units should elect, from among the residents of the district, three directors, one to serve for a term of two years, one four years,

and one six years, the successor of each to be elected for a term of six years. Such directors should have charge of the maintenance and operation of the canal system and it should be their duty to levy and collect tolls and assessments sufficient to cover the actual cost of the same.

BOND ASSESSMENTS TO BE LEVIED BY THE COMMISSION

It should be the duty of the commission to make annual assessments against all the lands of the district for the purpose of meeting payments due on the bonds that have been issued against such district, and it should be empowered to collect such assessments and to take such summary action as may be necessary for the enforcement of the lien. To this end full taxing powers should be conferred upon such district for the collection of assessments of every kind, and a farm unit application should be summarily cancelled or if patented, should be sold the same as in the collection of delinquent state or county taxes.

When 80 per cent. of the area which has been created into an irrigation district has been applied for and allotted no further assessment should be paid from the guarantee fund, but the full amount of the bond levy should be assessed each year against the lands so entered in the proportion as originally established.

RETURN OF GUARANTEE FUND

Whenever the commission should decide that no further payments need be made from the guarantee fund, an election of the land owners of the district should be called to determine what further use should be made of the same. The land owners should have the right to decide by a two-thirds vote if the commission shall pay from this fund annual bond assessments against all the land of the district until by this means such fund is exhausted; or, if it shall be held by the district as a fund to be available for farm mortgage loans for the benefit of the land owners of the district on such terms as might be decided.

FARM INSTRUCTION AND CO-OPERATION

A practical farm instructor should be employed who should be able to make his knowledge and experience available for the settler on his own farm. This cannot be done most effectively by the use of experimental farms alone, but by pointing out to the settler on his land the solution of his own peculiar problems by the means which he could best afford. Settlers should be encouraged and assisted to co-operate in the buying of their supplies, stock and equipment and in establishing farm industries and marketing of products. A small amount

of the payment made at the time of entering their land should be set aside to insure funds for the employment of instructors and assistance in carrying out these plans.

STATE GUARANTEE OF BONDS

The only serious objection which could be offered to the foregoing plan would be obviated if the state would guarantee the bonds of the proposed districts. Before this could, however, be done the constitutions of most of the states would have to be amended. The state could safely place its credit back of the plan proposed. The effect would, however be practically the same if it would purchase even a small portion of the district bonds.

MINIMIZING THE CHANCES OF FAILURE

The laws and policies of all the states engaged in this work are based upon the theory that these undertakings afford an opportunity for a safe and profitable *short time investment of capital*. The history of land settlement during the pioneer stage of the development of a new country shows that many years are required for establishing a profitable agriculture. Arrangements should, therefore, have been made for issuing securities running for a long time,—not less than twenty years—so the payments which would have to be made by the settler would be small during the pioneer period. An arrangement of this kind has always been within the discretion of the Land Boards and its adoption would have saved many enterprises from failure. The common practice of issuing short time securities, which has nearly always been followed in this country, in financing land development projects with such disastrous results will surely have to be abandoned and a plan adopted which fits the conditions peculiar to such work.

The provisions of the law which authorizes the creation of a lien against the land for the security of the money advanced for its irrigation has always been pointed to by the promoter and those representing the state as affording the investor full protection. But this lien is not valid until the land is irrigated. The land cannot be irrigated until it is settled and the works constructed, and the works cannot be constructed until money is available for that purpose. It is therefore seen that the capital which is necessary for this work must create its own security; a condition which is not generally considered attractive, and is accepted by the prudent investor only when it is promised that his interests will be protected by a trustee whose authority and integrity are beyond question. He was led to believe, that, in these undertakings, the guardian of his interests was a sovereign state whose first duty would be to protect the rights of those who had shown their faith and in-

terest in her plans in a way which could only enhance her fortunes. The present schemes as laid out on paper in the statutes of the states and the regulations of Land Boards, if not sound, are of good intent. Had those who have been responsible for the administration of these plans done their full duty, many failures could have been prevented and the confidence of thousands of small investors would not have been lost; but, through failure on their part to observe a few sound fundamental principles of business, these undertakings have lately become the traps and pit-falls in the western field of investment.

It would be unwise to assert that all the objections and weaknesses of existing laws and public policies would be removed by the plan proposed and that further failures could not occur. Failures will occur in such undertakings, as in all other things in life, as long as we are obliged to depend upon the judgment and honesty of men. The possibility of failure from these causes, is however, minimized when we have eliminated those forces which we readily recognize as working against the main purpose of our plans. It is this process of elimination which could be applied to such good purpose in connection with these matters.

The state does not lack appreciation of the value and possibilities of her resources. She should therefore relieve her undertakings from the burden incidental to private promotion. The state desires her lands to pass directly and as quickly as possible into the possession of actual settlers. This can easily be done; and, when it is accomplished the agriculture of these new sections of the West will have avoided much of the burden of over-capitalization which has been laid upon it all over the country by the land speculator. The state has been discredited in all the highways and byways of the land by the financial trickster under the cloak of her good name. This would be prevented by the plan proposed. We now have left: (1) The Department of the Interior that has thus far heartily co-operated with the state in these matters, and will without doubt continue to do so (2) The state, acting through experienced agents could have no greater interest than the success of her own enterprises. (3) The contractor, whose expectations would be a reasonable profit. (4) The actual settler who would assume, as he should, his share of the financial risk which might remain. Then there would be the investor with his bonds, protected by a lien against land which with its irrigation facilities should always be worth at least *one annual instalment*.

The plan proposed unfortunately does not make provision for the very poor or impecunious, but only for those who are prepared to share in such risks as cannot very well be avoided. We have not yet learned how, or we have thus far been

unwilling, to place these lands in the hands of this better class so as to establish the financial soundness of these undertakings. To provide for the needs of the former class would carry us into the realm of philanthropy, a step in the direction of which we are not prepared to take until we have placed the work already in hand upon a sound basis.

CONCLUSION

While the experience of the past few years in connection with the work of land development by irrigation has been very discouraging, it has not yet been demonstrated that it is beyond the resourcefulness of the people of the states to devise plans which will prevent the many losses now threatened, restore the confidence of investors and establish a sound basis for future undertakings. At the present time those representing the states in charge of this work stand more or less baffled by the outcome of the past few years' efforts in this field. It would, however, be a sad commentary on the resourcefulness and statesmanship of those whose efforts have met with such pronounced success in other directions if they should yield in the face of this first defeat.

The causes of the failures which have occurred to date once understood, it should not be a difficult matter to establish policies which would safely accomplish the ends desired. Such additional laws as would be necessary to put into force the plan which is herein recommended would not be difficult to frame. Indeed, full authority will be found in existing laws for much of the plan proposed.

It has been urged that, because of the failure of the plans which have thus far been employed by the states, further effort by them should be abandoned and the work turned over to the government. There is no doubt but what co-operative work could be done by the states and the Federal Government in some cases to great advantage, but wherever possible, this work should be done by the states unaided. The idea of assisting the impecunious settler by loaning him money is objected to by many because of the paternal relation which for this purpose the government, state or corporation would have to assume; it being urged that such assistance might develop a spirit of irresponsibility causing the recipient of such favours to place too great dependence in these agencies for support, the spirit of independence and initiative being by this means extinguished. *It is possible that the objection which is raised in the case of the individual might also apply where the state is concerned.* Without doubt one of the highest functions and privileges of citizenship is the devising of methods by which the efficiency of government of every kind can be increased. The overcoming of the obstacles in the path of progress is universally claimed to be in itself the highest

reward that can repay human effort. It is the overcoming of these difficulties which forms and strengthens the character and this applies to the Commonwealth with as much truth as it does to the citizen.

With all the experience that has been gained at first hand in these matters we have not yet advanced very far in the solution of our land settlement problems. The work has thus far been conducted in a "happy-go-lucky" fashion. The Federal Government has not even touched the problem as yet, nor have any of the states even considered the real work of closer land settlement as it will without doubt have to be undertaken before many years. Population is increasing in the United States at an alarming rate and the distribution of this population is causing many thoughtful persons to contemplate the future with serious misgivings, and sooner or later the country must solve some very serious questions which are growing out of conditions closely related to this matter. The Federal Government is but one unit in our legislative machinery, possessing limited powers, and frequently moves very slowly. There are, however, forty-eight states, each one possessing full authority to undertake the solution of this and other similar questions according to its ideals and along lines which would best promote its interests. The chief advantage possessed by our scheme of government is the opportunity afforded for trying out simultaneously, through the agency of the states, many different plans for solving our pressing human problems. A period of trial is nearly always necessary, for no man is infallible. Many of our best reforms and settled public policies have been evolved in this manner. Much valuable time has been saved, many lessons have been learned and the best plan has finally been adopted by all the states or by the Federal Government whenever possible. This alone should be a sufficient reason why the western states now engaged in irrigation work should be encouraged to continue their efforts. They will finally solve the existing difficulties and the experience which they are all gaining will be of incalculable value for it will enable them to press forward with that confidence born of success to overcome still greater obstacles which the future doubtless holds. (Applause.)

MR. E. H. BENSON, of Washington: Mr. Chairman, I notice on the programme we have a discussion marked after each of these talks. It strikes me there are a lot of things said by the last speaker which would well promote some discussion, and I would like to refer to that portion of it which limits the time of payment to a certain number of years, and which would make the interest charge, assuming the discount and interest rate at six per cent. and probably seven, to the settler, an

annual interest charge of \$5.25 per acre for the first ten years. That's pretty stiff for a man going on to a piece of raw land. At the end of the first ten years, he has ten per cent of the principal, and I think ten per cent. is about the cost we have to face, and he has got to pay \$12.75 per acre per year for the next ten years, and that is a pretty stiff tax. While I think many of the suggestions in that talk were most admirable and will perhaps pave the way for getting out of difficulties which now seem insurmountable, it seems to me a better scheme to make the loan long enough so that by adding one per cent to the interest on the bonds, you will wipe out the loan in that way, and finally pay off the debt.

I am sorry that the size of the hall prevented some gentlemen at the rear end from listening and understanding all that was said. I think the many new ideas in that talk will require very careful study and reading at home. I would like to know if anyone else has any suggestions to make, particularly in the matter of getting settlers on to the land.

MR. C. E. BURLINGAME, of Washington. Mr. Chairman: When I came here I thought Mr. Benson was going to stay at home. You said that a man who takes up land under this irrigation system should not be allowed to sell it. Now, it's all very well to encourage a man to go on to the land and build up a home, and tell him he can have a fine home, and seventy-five per cent of the men who go on an irrigation project go with the idea of building a home, but I would like to propound a hypothetical question to you, which will give the audience something to think over.

Supposing a settler goes to one of your irrigation projects and takes eighty acres of land and pays his instalment, builds his fences and a house, and he builds a nice barn, and levels his land,—and you will find that is a serious job, preparing this land for water. He has money enough for that and he seeds it and beautifies it and makes it a home. He may be only one man in ten on the project who knows how to do it. If he keeps a book account on his farm, he will find it has cost him many thousands of dollars and a great deal of hard work. What is the result? That man by his intelligence and labour and his knowledge of the work has not only doubled and trebled the value of that work, but he has become of value to his community. He has influenced the value of the land, in that vicinity, by showing others that they can do the same thing. The gentleman who has just read the paper has put the stamp on that.

Here is a man with money who can come along and say "I am willing to exchange my easy money for this man's beautiful home, and I will step in and you can go and fix up another farm." According to the speaker, you have forbidden him from doing that. Whether it is cause for congratulation

or misfortune, there should never be anything put in the way of forbidding a man from making money by his skill and hard work. Furthermore, he is not a speculator. When a man puts a million dollars into a packing house, he does it because he expects he will make money on it. He does that for the money that is in it. He is not a speculator. You want the investor. That is the man that you want to get into this western country, and if you have got a proposition that forbids a man from making money out of his hard work and knowledge on your irrigation project, you give your proposition a black eye.

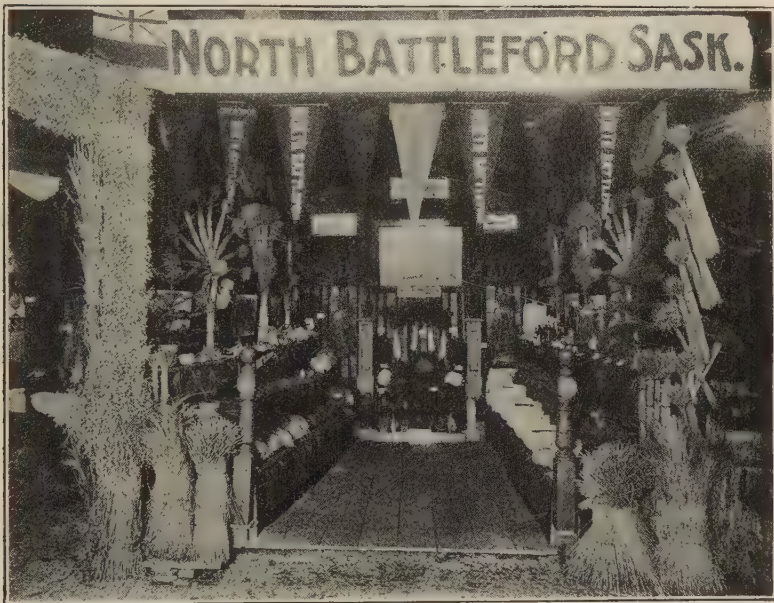
Gentlemen, I can take a farm and beautify it, and if a man with money says, "you step out and I will step in", why shouldn't I? Your big land companies in this country do not shut a man out because he cannot pay his interest. They look a man over, and if he is sober and industrious, they say, "go ahead, and pay me interest next year", and those are the people that we get on our farms, and that is the reason that the irrigation propositions in the states of Washington and Oregon are succeeding. You can go to the state of Idaho and find 10,000 acres sold and there has never been a cancellation, simply because some one has been ready to take up the land. If a man meets sickness or disaster, they can sell their land at its value instead of having it auctioned off for next door to nothing, because he is not allowed to sell it.

MR. ROSS: It is quite evident that I have not succeeded in making clear one feature of this matter. There is that precarious condition which we must endeavour to make sound. Now, up to the present time, these Carey Act projects have been in the hands of the promoter who has cared all too little for the interests of the investor. There are exceptions to that, but in general that is the spirit of the promoter. They have been in the hands of the speculative land owner. The thrifty, industrious, intelligent farmer, to whom the gentleman refers, is the man who will be welcomed. If we could get enough of the land into his hands, we would not object to him occasionally selling at a profit, but unfortunately we do not often get that kind of man on the land.

It is the history of the Carey Act projects that these lands have been placed in the possession of an entirely different kind of man. Now, the position is that the state has pledged these lands for the return of the capital, and that pledge is worth nothing unless the lands are cultivated, and we are simply going to tide the situation over for a short period of three years, at the end of which the labour of the farmer will be productive and these assessments which I propose will be paid from the earnings from the land. At the present time, however, because of the large percentage of speculative farmers, the investor loses out and the non-productive period

lengthens to ten years. You speak of the successes in Idaho, which is my own home state. There are forty Carey Act projects in Idaho, and I regret to say that very few of them have succeeded. There are bonds scattered all over the land, bearing the name of "Idaho" upon them, and they are bonds issued by companies which have promoted and floated these Carey Act projects.

One issue of bonds was found to be in the hands of over 10,000 holders, and I am personally acquainted with the projects, and I am thoroughly convinced that upwards of sixty per cent. of the lands are in the hands of speculative



NORTH BATTLEFORD EXHIBIT.

holders. Some of those people have made neat little fortunes out of these claims, and not a furrow has been turned. It was a pure gamble. The bond holder, who was a small investor, is the man who has been left with the paper. Anyone who had \$100 saved up was inveigled into buying these bonds, waitresses and bar-tenders. I am satisfied in the state of Idaho alone there are now outstanding over \$16,000,000 worth of bonds against those projects, and they are probably in the hands of 25,000 holders. I may state that these projects against which those bonds stand, stand to lose from \$4,000,000 to \$6,000,000.

MR. H. W. GRUNSKY, of California: I would just like to say a word in support of the gentleman who read the address. I have been around the state of Oregon a great deal, and I know that one of the conditions in those Carey Act projects is that a great many people take options on these lands, or get hold of them in some way, and they are not actually settlers on those lands. Now, perhaps if the Carey Act laws and the state laws and the United States laws were administered absolutely to the letter of the law, that would not be possible, but the speaker called attention to the fact that owing to the state of the administration of these matters, a very different thing in practice often happens.

I know some Carey Act projects in the state of Oregon, where 200 pieces of land were taken up, and given over to the possession of parties and only about 16 settlers were on the land. Now, it is that condition, I understand, which it is desired to be avoided, and I understand that the speaker's position is to avoid these transfers of lands during the early stages by these speculators who have not gone on to the land, nor built their houses, gardens or fences, but still hold the land and want to sell nothing for something. That is a condition which I think we should endeavour to avoid.

PRESIDENT YOUNG: We have a communication from the Alberta Club, as follows:—

INVITATION FROM ALBERTA CLUB

Alberta Club, Calgary,
Oct. 5th, 1914.

Arthur Hooker, Esq.,
International Congress,
Calgary, Alberta.

Dear Sir:—

On behalf of the Executive Committee and members of the Alberta Club, I have great pleasure in extending the privileges of the Club to all delegates attending the 21st Annual Congress.

The badge will be sufficient introduction.

Yours very truly,
(Signed,) J. F. PORTER,
President.

PRESIDENT YOUNG: I see the Clubhouse is situated on Seventh Avenue, between Centre and First Street East.

INVITATION FROM Y. M. C. A.

The Young Men's Christian Association, through Robert Pearson, General Secretary, extends a like invitation to all of the delegates, and with it, the use of the gymnasium, natatorium, reading room, or any other privileges that you may desire.

The following is a letter received from Janse Bros., Boomer, Hughes & Crain.—

INVITATION TO VISIT GRAIN ELEVATOR

Calgary, October 3rd, 1914.

Arthur Hooker, Esq.,
International Irrigation Congress,
Room 3, Board of Trade Building,
Calgary, Alberta.

Dear Sir:—

We are pleased to extend to the Irrigation Congress assembled in Calgary this coming week, a cordial invitation to visit the Dominion Government Interior Terminal Elevator now under construction for the Board of Grain Commissioners.

It is anticipated that—when completed—this elevator will handle practically all the grain grown in the Dominion west of Regina, in the province of Saskatchewan, cleaning, separating, grading and storing for shipment through Vancouver to Asia or the Panama Canal.

The elevator is a duplicate of the two to be opened at Moose Jaw and Saskatoon, October 5th, and consists of a working house, having a holding capacity of half a million bushels, and a storage annex of two million bushels capacity. At present, foundations are being placed for the storage annex and the bin tanks of the workhouse are under construction.

The elevator is located in East Calgary, on the Ogden carline. Ogden cars leave the City Hall corner on Eighth Avenue on the hour, the round trip requiring about one hour.

Yours very truly,

JANSE BROS., BOOMER, HUGHES & CRAIN.

(Signed) A. M. CRAIN.

Associate Member, American Society of Civil Engineers

INVITATION FROM P. BURNS & CO.

PRESIDENT YOUNG: Messrs. P. Burns & Company, Limited, through their Treasurer, Mr. Black, extend an invitation to the Congress to visit their packing house in East Calgary, said to be one of the most modern packing houses on the continent of America, and suggesting that it would be convenient to visit before three P. M. The wives and daughters are also invited.

The delegates are requested at once to hand in their railroad certificates to be validated at our head-quarters, or to Mr. Miller, the Secretary of the Board of Control. That is before noon of Wednesday.

I will repeat in brief the announcement made this morning that owing to the fact that delegates are still arriving, it is suggested that the state, national and provincial delegations

do not organize until after our session to-morrow morning, at which time certain officers and committeemen are to be appointed and selected.

There is a change in the programme to-night. We will have the pleasure of listening to the Irrigation Congress chorus, which I understand consists of about three hundred and fifty voices, under the direction of the well known conductor, Mr. Max Weil. Otherwise, the programme will remain as printed, with the exception of the address of Mr. M. C. Hendry, which will be delivered later during the week. Mr. Newell, will deliver an illustrated address to-night in place thereof, as well as his greetings from the United States Department of the Interior.

There is no further discussion before us, gentlemen, what is your pleasure?

MR. C. E. LAURENCE, of British Columbia: Mr. President, would it not be possible to extend the ten minutes for discussion, where there is a real live interest being taken in the discussion?

PRESIDENT YOUNG: That may be done, Mr. Laurence, by unanimous consent. Of course, if there is a desire that the rules be suspended, and the assembly suspend them, it can be done.

The meeting here adjourned until 8 P. M. of the evening of Monday October the 5th, 1914.

THIRD SESSION

MONDAY, OCTOBER 5, 1914

8 o'clock p. m.

The meeting was called to order with President Young in the Chair.

PRESIDENT YOUNG: The meeting will kindly be in order.

The first number on the programme consists of some four patriotic selections by the special Irrigation Congress Chorus, under the direction of Mr. Max Weil, the Conductor. (Applause)

The following selections were then rendered by the choir:

God Save the King. (Applause)

The Star Spangled Banner. (Applause)

The Belgian National Anthem. (Applause)

O, Canada! (Applause)

PRESIDENT YOUNG: Coming, as I do, from a city that boasts the largest standing choir in the United States, the city of Salt Lake, and a choir that has won a good many prizes in national and world contests and being, therefore, somewhat familiar with a big a choir and a good choir, I very sincerely congratulate Calgary on such an excellent choir and such a superb leader. (Applause)

The next number on our programme consists of a greeting from the United States Department of the Interior, to be conveyed by Mr. F. H. Newell, Director of the United States Reclamation Service. (Applause)

Greetings from

United States Department of the Interior

Conveyed by F. H. Newell

Mr. President, Your Honour, Ladies and Gentlemen of the Irrigation Congress and of the City of Calgary:

I had the pleasure this morning of speaking briefly and conveying to the Congress the message of interest in the work of the Irrigation Congress, from our revered President, Woodrow Wilson. This evening I am further honoured in being given an opportunity to say a few words on behalf of the Department of the Interior, one of the ten executive departments of the Federal Government, and one which has much to do with the work with which this Congress is concerned.

The Department of the Interior of the United States, has, amongst its other manifold duties, that of looking after the public lands of the country, of the Indians who are occupying the areas set aside for them; also the Geological Survey which has charge of the duty of classifying public lands and of ascertaining the extent of these resources and out of whose activity has grown what is called the Reclamation Service, that branch of the government which has to do with the expenditure of public funds in the construction of works for the irrigation and reclamation of arid lands. Later on in the evening, I will tell you something of that work, but now my mission is to convey a message from the head of that department, Franklin K. Lane, a man whom we all respect and admire, and a man whom we regard as of presidential timbre, but who by reason of one accident, that of birth, one which you may not regard as at all a detraction, the fact that he was born on this side of the line, namely, in the Dominion of Canada, but one which renders him ineligible for the highest gift in the hands of the American people, otherwise I am sure he would be seriously considered for that place.

Mr. Lane much regrets his inability to attend this Irrigation Congress, but, as you know, the Congress is still in session in Washington and naturally Mr. Lane can hardly undertake this trip. In turn, the First Assistant Secretary, Mr. A. A. Jones, of New Mexico, had intended to come, and on his behalf particularly I wish to express his sincere regrets at the impossibility of attending the Congress. Perhaps what he has lost in that respect, I have gained in the opportunity of getting wider acquaintance with you and with the resources of this part of the country.

In our work in the Department of the Interior, we are learning much from your experience. You have the same problems; you have worked them out in one way, and we are working them out in another. We are trying to gain ideas which will lead us to carry on the work on our side of the boundary with still greater effectiveness.

Thanking you for the opportunity of appearing before you, and expressing the sincere regrets of Mr. Lane and Mr. Jones, for being unable to attend, I can convey to you their heartiest appreciation of the work you are doing and their desire and hope of its successful continuance. (Applause)

PRESIDENT YOUNG: The following number will be the rendition of British patriotic airs by the Irrigation Chorus. (Applause)

The following selections were then rendered by the choir:

Rule Britannia. (Applause)

Encore. (Applause)

Hearts of Oak. (Applause)

Encore. (Applause)

The Maple Leaf Forever. (Applause)

Encore. (Applause)

PRESIDENT YOUNG: It is not at all necessary for me to introduce to an audience of the Dominion, our next speaker. It is only necessary to announce that the next number will be an address by the Honourable Duncan Marshall, Minister of Agriculture for Alberta. (Applause)

Address by

The Hon. Duncan Marshall

Minister of Agriculture for Alberta; President Western Canada Irrigation Association

Your Honor, Mr. President, Ladies and Gentlemen: I have been requested to-night to make some remarks with regard to agricultural education in the province of Alberta, but before I refer to this subject I have a few things on my mind which I would like to say. The first is, that I want to offer the Local Board of Control, who have had charge of the arrangements for this Convention, my sincere congratulations. I can offer them freely because I have been out of the province and have not been in a position to personally lend them the assistance I should like to have done, but I want to congratulate the men who had charge of the holding of this splendid Convention in the province of Alberta, for their courage in going on with the Convention under the existing circumstances. (Applause) I am glad to have it proven to you—as far as I am concerned personally, I never had any doubt about it,—that the men who had charge of this business had the kind of courage that would enable them to go on with their ordinary business affairs in spite of the terrible calamity which is in progress in Europe at the present time, and, sir, if this Dominion of Canada is to do the things she ought to do at the present time, if she is to produce the results that she ought to produce, then, that will only be brought about by every individual citizen of this country, every member of any committee, or any organization in this country, such as this is, carrying out his business and his duties just as though nothing was the matter, and this is the best and the highest service that we can render to the Empire, of which we are so proud to be a part,

in the present great crisis; so I am glad to find on my return here that these men were neither daunted nor discouraged, but that they went ahead with this Convention, and that this splendid public gathering to-night justifies the courage and the enterprise which brought it about.

Mr. Chairman, Ladies and Gentlemen, it seems to me that this is a very appropriate gathering at this time. It seems to me rather significant that delegates from the great Republic of the United States to the south of us, and from the great nation of the Dominion of Canada, should meet at a time like this under circumstances of this kind, to discuss what is, perhaps, after all, the greatest art of peace, and it is significant that we should meet, the men who are tilling the land to the south of the line and the men who are trying to develop the splendid prairies in our country, that we should gather together at this time to discuss the best systems and the best means of making our soil more productive and our homes more attractive and more desirable on the land in both countries, because we are the great illustration to the world to-day, of how two mighty nations can live side by side on the most intimate and peaceful terms. (Applause)

Let me tell you gentlemen, that when this war ends, and I hope that it will not be long, as every one does, before it ends, though we know not how long it will be, let us hope that when it does end, the settlement will be on the basis of the peaceful relations that exist between these two great countries. (Applause) And the men who have to settle these questions will be able to point to Canada and the United States, separated by four thousand miles of boundary line, without a gun frowning across it, without a fort of any kind or description on either side, separated by lakes that are in fact inland seas, and yet, not a battleship floating on any one of these great waters. (Applause): Let me tell you that this is the reason that we are at peace today. (Applause). And Europe is at war because they thought they could preserve peace by arming to the teeth that they might fight, pillage and destroy. Some men blame individuals and persons for this war, but it is impossible for fifty years to train men that the highest occupation and ideal of life is that of fighting their neighbouring nations, you cannot train these men, build battleships, and make guns and ammunition, without having some one stir up a fight in order that they may get at one another's throats, and use these munitions of war. You and I have shaken hands together in this great Congress to-day, and we have been glad to meet those of you from across the line, but, let me tell you this, that if for fifty years we had been throwing up earth works on our side of the boundary and you had been planting cannon on your side, and we had been

building battleships on Lake Superior, and you had been building battleships on your side, long before now, some fool on either side would have fired a gun which would have started a war. (Applause). We have not been spending our time and energy and money in that kind of thing. Long since the Dominion of Canada and the United States of America have so far respected one another, that they have beaten their swords into plough shares and their spears into pruning hooks, and they are pursuing the peaceful occupation of agriculture which we are here to discuss instead of being in a state of war, which has never benefited nor never will benefit anyone.

For this reason, I am proud, Ladies and Gentlemen, to-night, to welcome to this gathering, many men who have come over here to discuss these great problems that are facing your country and mine; problems that are, after all, the greatest problems in any country and the foundation of the true success of any country or nation. Those are the problems of agriculture and of the production of food stuffs for the world, and let me say that this great crisis in Europe to-day has done more than any one thing in the last twenty-five years to bring home to the people a realization of the importance and necessity of agriculture after all. Those nations have their armies in the field, and they are fighting to the death to-day, and what is sustaining those armies; what could they do if they had not clothes or food, and where do these things come from? From the soil. Some authorities say that the only end of this war will be the end of food stuffs to feed one or other of the contending armies. At times of war, we find we have to come back to the man on the land, and it is the production of the soil of the countries that are in this mighty struggle now that is going to determine the end of the fight.

During my recent visit, when I talked to men in public positions in Britain, and men in the army, they said "We are glad to have some of your good Canadians come over; we are glad of the spirit it shows. We are proud of your patriotism and interest in the Mother Country, but the one serious question we want answered is, whether or not you can feed us during the war; whether you can supply us with foodstuffs to sustain our armies in the field". Are the people of the Dominion of Canada, under the existing circumstances, performing a patriotic duty, that of rendering their soil as productive as possible, and of utilizing every effort and energy to attain this end and of guiding these efforts and energies by the most scientific and up-to-date methods known to mankind, in order that during the suffering that will result in these countries after the struggle, we may be able to send across the water, foodstuffs to sustain life in

Great Britain, and some of the other nations of Europe? That is the business that is on the hands of the citizenship of this country, and perhaps there could not be a more appropriate time to call together a meeting of this kind, a representative gathering of men from both sides of the line, to discuss one of the great problems of agriculture which is exciting a good deal of attention in your country and in ours at the present time.

It was my good fortune or misfortune to witness the mobilization of almost the entire Belgian army. I saw those men gathering for three days in that little country of Belgium which has excited the admiration of the entire world. (Applause). Nobody ever thought these men could make the stand they did, and I want to say, that as far as my observation goes, at least seventy-five per cent of the Belgian army came from the land. They were the farmers and the farm labourers, and when they gathered in the towns and villages and cities, they were perhaps not as dapper looking as some of the soldiers of some other nations, but they came from the land, and they had therefore carried on the kind of labour and occupation that gives sinew and muscle and strength and courage, and there was one other thing about these men; they were going out to fight for their homes. (Applause). In travelling through Belgium, and my statement is corroborated by everyone who has gone through that country, I saw the most efficient agriculture that I ever saw in any country. In travelling for hundreds of miles, I never saw a poor field of grain; not a single field that I could call a half crop. Every field was as good as the next one, and that was the best crop I ever saw. Another thing, I never saw a weed in a field, and I wish I could say the same about Alberta. In no field in that country did I see weeds that could be noticed. Why? Because these men are efficient in their business, and it is efficiency that counts, and I knew when I saw those fields and those homes, and those crops, I knew that men who could farm like that, could fight. (Applause). And you usually find that it is true; the man who is efficient in one thing is very apt to be efficient in something else. The man who trains his mind and his efforts along a particular line, will be the man upon whom we can call to do some other thing, in which perhaps he has not had much training, but will do it well. These men did the thing they were called upon to do, and they did it well in the defence of their country.

Now, it seems to me that perhaps some good things will come out of this war, although it is a terrible price in blood and money to pay for anything. The war is on, though, and one of the things that is going to be an outcome of it, is more attention to agricultural development, in every country

in the world, and perhaps there is no place that offers better opportunities, perhaps there is no place that offers better openings for men desirous of developing land and building up agriculture and co-incidentally homes for themselves, than the western part of the Dominion of Canada. So we hope that in the next few years our efforts and our energies will be bent perhaps more than they have ever been in the direction of improving agriculture and agricultural conditions in our country. More than that, men are awakening up all over, not only farmers, but professional men and business men. I was rather surprised, in visiting that great seat of learning, the University of Cambridge, when I asked what title they gave the head of their school of agriculture there, they said they called him the "Draper's Professor of Agriculture." That name did not indicate a great deal to me, and I enquired where the draper business came in. They said it was a Draper's Association in England that had subscribed the first money for the establishment of a school of agriculture in that great University of Cambridge. The Draper's Association had wakened up to the fact that it would not be a bad thing to spend money in developing a higher class of agriculture even in that good old agricultural country of England. Men are awakening to the fact that if agriculture is to get its proper place in the world's industries, and if the development of the country is to go on in the manner in which it should go on, they have got to begin by building up agriculture first. In the past history of our country and of many countries, a goodly section of the community have satisfied themselves with just taffying the farmer, and they have praised him, and patted him on the back, and called him Nature's Nobleman, and horny handed son of toil, and they told him that he occupied the most independent and glorious position in the world; that he was the only man who was his own boss, and their blessing was "May the blessings of Heaven follow you all your days." They have followed him, but they have rarely overtaken him.

I listened with some interest this afternoon to an address from a gentleman across the line in which he was referring to the unprofitableness of pioneer work in agriculture, and we have found that in our country, as he said it had been in his, that the men who go on the land in the beginning have a mighty struggle to break it and get it under cultivation and to create a good farm from a piece of raw prairie. So do I believe to-day that never before was there a time when it was more incumbent on governments and organizations of every kind who desire to see the welfare and prosperity of Canada continue in the next decade, as it has done in the past, to do a little more for the development of agriculture than they have done in the past. We have got to improve

conditions on the land, we have to bring agriculture up to the status it should occupy. There is a great cry today "Back to the Land" and you hear it everywhere. I am not as much interested in the cry "Back to the Land" as I am in the business of keeping the men who are on the land, that are there to-day.

I know a number of business or professional men who became millionaires and undertook to own a luxury called a farm. They go and spend week ends at it, lying in a hammock reading the latest novel with a glass of buttermilk and a couple of straws, and they watch the hired man sweat while hauling hay. They will entertain you at their table



REVELSTOKE EXHIBIT.

with butter produced from their own farm that costs them two and a half dollars per pound. They will feed you on pork chops straight from their own farm which cost them a dollar and a quarter a pound. We are glad to have these men make these experiments so they will find out how hard it is to make a living on the land, and give them a keener appreciation of the fight that a man has to make, who goes out on the land in this country to battle for a livelihood for himself and his family, and a competence for his old age. The farmer is probably the only producer who has to be dictated to as regards the price he shall get for his produce.

The man who is a manufacturer can figure out the cost of his labour and his material and his overhead expenses, and he can add all these things together and a goodly profit to that, and sell his goods for that price, and he does not have a great deal of trouble in making both ends more than meet.

The farmer sows his field of grain. If he could be guaranteed that it would yield thirty bushels to the acre, he would be safe in spending money ploughing his land, getting it into shape, buying his seed, paying for implements, help, horses and seeding his crop, but he doesn't know whether his crop is going to be thirty bushels or three bushels to the acre, and about half the time, the average is a lot lower than he expected. After he gets that grain in the granary, what has he got to say about the price he will sell it for? He has nothing to say about it. He is not able to add up the cost of his labour and his time, and the seed, and the interest on his investment, and overhead expenses, to say nothing of a profit, and put that price on his grain. That is the risk that the man has who is on the land to-day, in addition to which he is contending with nature, and he has to meet all kinds of misfortunes from various causes, not the least of which is the weather. Even irrigation congresses run up against the weather sometimes, and the farmer has just the same trying circumstances every month of the year that we have had to-day in connection with the gathering of people into this Convention, because of a caprice of the weather. Because he has to fight these things, because he has to make a struggle of this kind, we should endeavour to use every effort that we legitimately can to assist him, and I do not believe that governments can go much too far, and that enterprises of this kind can go too far in giving the farmers of this country every assistance and every opportunity to make good on the land and build up an agricultural business in this country which will be the foundation of the future prosperity that we hope for and expect.

On the other hand, the farmer has an advantage over the man who leaves the farm to go to the town, because men have been lured from the farms to the towns in your country and in my country, by the cry that men could not live comfortably on farms. Just as Mr. Bruce Walker said this afternoon, one man in his experience left because his wife did not enjoy the society of her neighbours, and she wanted to move somewhere else, and I have a good deal of sympathy for the women who live on the prairies in this country, helping their husbands to homestead. In fact, I have a sneaking notion that if it was not for the tenacity of the women who live in the shacks of the province of Alberta, there would be numbers of these homesteads abandoned a good deal sooner than they are. (Applause). But

the thing the man on the land can do, is to hold things together until he can make a home for himself. For the last ten or fifteen years, men have been lured off the land in this province, and also in the United States, until the rural population has been depleted and our urban population swelled. These men were called from the land by speculators in the city, by the men who owned land and who wanted to divide it into small pieces and sell it to their neighbours for more money than they paid for it, by men who never desired to raise anything on the land except the price. They are the men who have been luring our farmers away from the land and into the cities. I know numbers of farmers in this province who called an auction sale and sold everything they had and mortgaged their homesteads for all they could get, and went to the city of Calgary and the city of Edmonton, and they bought vacant lots and they have them still, and they are paying interest on the mortgage on the farm and rates and taxes on the vacant lots, and they wish to the Lord they still had the old gray mare and the brindle cow to go back to farm with. (Applause).

I am glad that a state of things has come about in this country, and it came about without the war, although maybe the war will accentuate it, when people will realize that the only true prosperity upon which the average man can bank is the prosperity that he earns. The gospel of work was very nearly a forgotten creed in this country, owing to the speculation that prevailed for a few years. Now if there is a cry of "Back to the Land" it is mostly from the men who were on the land before, and who learned something of agriculture then. I hope they will have success on the land when they return to it, and I hope we shall be able to assist them in getting back to it, because if we are going to build up permanent prosperity in this country, to amount to anything, it is going to be from the land. We have many manufacturers in Canada to-day, and we are glad to have them, but they will only be built up successfully and operate their factories and mills successfully when the farmer has real money which he has dug out of the soil in his pocket, to buy the goods that the factory makes. If the farmer cannot pay his bill to the merchant, the merchant cannot pay the wholesaler, the wholesaler cannot pay the factory, and the factory cannot pay its hands.

No matter what our business in this country is, we cannot hope to live and prosper unless we are producing wealth in this country, and the only way to create wealth is to dig it out of the ground, and that is the business which we have on our hands in this province of Alberta; and I believe that in the next few years there will be more effort and more energy spent on the raising of live stock and the production

of grain crops in this country to sell on the markets of the world, in order that Canada may grow prosperous, than has been spent in the last few years.

That brings me to the topic that I was asked to discuss, and, incidentally, to the end of my time, but the Chairman told me I might just take a few moments over my time, and I will take that time to say a few words with regard to agricultural education in the province of Alberta.

We have believed, in this province, in the principle of training the boy who is going to farm, and consequently we have established schools of agriculture at different parts of the province in order that these boys might reach them conveniently, and last year we had 268 students as freshmen in our three schools. This year we now have registered somewhere in the neighbourhood of 300 students in the three schools of agriculture, who are sons and daughters of farmers in the province of Alberta, who are going to get some training in agriculture this winter. (Applause). We are endeavouring not to make this training highly scientific. We are endeavouring to use apparatus in our schools and to use methods that the boys and girls can use at home. I believe that Agricultural Colleges and Universities are a splendid thing for the purpose of training men to take positions in the profession of teaching, but as far as training boys to farm, they have not proved a success. Why? Because the work has been too highly scientific, and when a boy goes through an agricultural college, and gets accustomed to using the apparatus which they have there, and knows that he can scarcely ever have these things on his own farm, he is bound to become discouraged. One of my professors in chemistry asked me for a thousand dollars' worth of apparatus to teach the boys this year. I told him that anyone who could not teach these boys any physics they needed to know, with an iron pot and a wooden stick to mix with, wasn't any good in that school, (Applause) because that is about all the apparatus the boy is going to have at home with which to study chemistry or physics. It is in that way that we are trying to make these institutions practical.

Let me tell you that we had students last year who spent less than three months in the public school during their lifetime. One boy could neither read nor write. These were the sons of the pioneers who blazed the trails in this country, and who were so busy building their homes and stables and fences and breaking the land and trying to get in a little crop, and milking a few cows to get along, that they were not able to let their boys and girls go to school as they wanted. I have no doubt that many of these men wished time and again that they were able to give their children

the education they required. Yet these boys and girls came into our schools last winter, in which there is no entrance examination, no qualification, except a desire to learn and know something more about the business of life which they are going to follow. Many of these boys and girls had very little education but we teach English and mathematics and kindred subjects as well as agriculture. One boy who could not read or write last year can read and write now, and in the dairy lessons he headed his class, and in the stock judging lessons he came well up to the top, with the result that when this year is over, that boy is going to have a reasonably good education. If we can get institutions of that kind established and bring to the boys and girls of this province the opportunity to improve their education, as well as some scientific training in agriculture, then we will do something for the future citizenship of this province, because the thing that has ailed agriculture in the past has been that feeling that has pervaded the country that anyone could be a farmer, and if a man was particularly ignorant and absolutely uneducated that farming was the job for him. It was the one thing for the dull boy.

What we want to teach the people of our country is that there is no business or calling in life that requires more knowledge of the world and its conditions, that requires more scientific knowledge, if you choose to call it such, than the business of tilling the soil and raising live stock in this country, and in that way we want to dignify agriculture, to make it the honourable profession it should be. The day is past when the comic paper can call the farmer the rube and the jay. The farmers of this country are recognizing that farming is a business that requires education and training, and that no government is doing its duty which does not place before, or as near the door as possible, of every farmer's son and daughter in this country, who intend to spend their lifetime on the farm, a chance to receive the kind of a training that will make their business in life a thing of interest, pleasure and satisfaction instead of a life of endless drudgery. How often do people ask "Why do boys leave the farm?" How often have we heard boys complain when they came in from work, and say they are only on the farm because they cannot get off it. That is not very often the case with the professional man. The man who trains in medicine and attains scientific knowledge of that business, goes on and on, and there is no limit to the interest which he has in his business and his profession. The same is true of law. His business and his profession become interesting to him, and that is why he will work all night at it. Some people say that the hours are too long for farmers. Hours are never too long for a man to work at a job where his

heart is. Hours are never too long for lawyers who sit up hour after hour at nights, working up cases which they may have charge of. Hours are nothing to a physician who gets up in the middle of the night in order to save the life of some patient in whom he is scientifically interested. Hours will never be too long for the boy who has an interest in the farm, in producing some result on that farm which will be the pride of himself, his family and his neighbours. You must get the farmer to have the same viewpoint of agriculture if you want to make it the profitable and successful business it should be in a province that has as much splendid and productive land as we have here.

Mr. President, Ladies and Gentlemen, there are many other things that I have on my mind to say to you, but I am not going to impose on you this cold night. I have been glad of the privilege of meeting the men who have come from the other side of the line, to join with us in discussing some methods which will improve agricultural conditions on both sides of the international boundary. There is no rivalry in this matter; we are glad to have you come over and tell us what you know, because by an exchange of these ideas, and by gatherings of this nature, we will help to awaken public sentiment to a realization of the all importance of agriculture to this country, and to countries which lie side by side in which there is the greatest opportunity for all those men who may wish to get across the water when the gigantic European struggle is over, that they may get away from the kind of thing which is taking place there to-day, and settle in a land filled with peace and plenty as are the United States of America and the Dominion of Canada. (Applause).

Just let me say one thing in conclusion, and that is this: As a great railway company has had a great deal to do, (or the Natural Resources Department of it has had a great deal to do) with the organization and success of this Convention, let me say as Minister of Agriculture for this province, that the railway companies in the province of Alberta have been generous to the Department of Agriculture in many ways, in assisting us in transportation for our livestock and our instructors for the province of Alberta, in the last half dozen years. In that way, and a number of other ways, they have co-operated in the most whole-hearted fashion possible with the department for an improvement of conditions in the province, and no man has been more generous, no man more sincere in this business, than has the Chairman of the Board of Control of this Convention, Mr. Dennis. (Applause).

Mr. Chairman, Ladies and Gentlemen, I thank you. (Applause).

PRESIDENT YOUNG: That is surely a magnificent speech that we have had the privilege of listening to. It was chock full of what we in the United States call good horse sense. No matter how backward your crops may be here in Alberta, owing to adverse climatic or other conditions, I am inclined to believe that the Honourable, the Minister of Agriculture, could make these backward crops quite ashamed of themselves, and could talk them into a state of ideal enthusiasm and responsive exuberance.

Secretary Miller, of the Board of Control, desires to make some announcements, and after he has concluded, we will be favoured with some music, a song entitled "Land of Hope and Glory" by the Irrigation Congress Chorus, with Miss Zelig Delsart as soloist.

SECRETARY MILLER: Although it is mentioned on the programme, I think there are some delegates and others who overlooked the fact that the official badges will be recognized on the street railway. We have made arrangements with the street railway whereby the badges worn by delegates and others, will entitle the wearers to a free trip wherever they may wish to go on our street railway system.

The superintendent of the street railway wishes me to announce that there will be special cars on 17th Avenue to convey you home at the close of this session.

Announcement read regarding Lieutenant-Governor's reception.

Announcement read regarding entertainment of Ladies.

Announcement read regarding Engineer's Banquet.

The song "Land of Hope and Glory" was then sung by Miss Delsart and the Irrigation Congress Chorus, with accompaniment by Mr. Percy Hook. (Applause).

PRESIDENT YOUNG: There has been a change in the concluding number of this programme, and for the last number will be substituted an illustrated lecture by Mr. F. H. Newell, Director of the United States Reclamation Service, on "Water Storage and Distribution by the United States Reclamation Service." I would like to say to the members of the choir that Mr. Newell believes that the pictures will show just as well on the reverse side of the screen as on this side, and he fancies that you will be able to see the views cast on the screen from your present places.

Address by

F. H. Newell

Director United States Reclamation Service

**WATER STORAGE AND DISTRIBUTION BY THE UNITED STATES
RECLAMATION SERVICE**

Mr. Chairman, Ladies and Gentlemen:—While the preparations are being completed to show the pictures, I will briefly introduce to you the subject of my talk of to-night. Following the eloquent address of your Minister of Agriculture, the Honourable Duncan Marshall, I feel that my words will sound commonplace, but through pictures I hope to arouse your interest in the work which is being carried on by the government of the United States in the effort to provide opportunities to get back to the land or to keep the man on the land, as outlined by Mr. Marshall. The work of which I propose to speak was authorized by the Act of June 17, 1902, which devotes the proceeds of the disposal of public lands to the building of irrigation works for the reclamation of arid areas in the western part of the United States. The object, as described by Mr. Marshall, is to give opportunities for home seekers and for men to obtain homes for their families. In that effort we have already expended over eighty million dollars, and although all the works are not on as great a scale as those with which you are familiar, namely those of the Canadian Pacific Railway, yet they are worthy of your consideration.

The people of the United States, acting both through the government of each state in part, but more largely through the Federal Government, as just noted, have made and are making efforts to provide opportunities for homes for citizens in the more sparsely settled localities.

The first notable attempt was in the Homestead Act, enacted at the time of the Civil War. This was followed by the Desert Land Act, permitting a settler to acquire 640 acres, later modified to 320 acres on condition of irrigation of a portion of it. The swamp and overflow lands were donated by the Federal Government to the states on condition of reclamation, and in 1894, each state was permitted to select upwards of a million acres of arid public land under the terms of the Carey Act, on the condition that it would be provided with irrigation systems.

Finally, in 1902, the Federal Government itself entered upon the direct work of building irrigation works, and for this purpose, devoted the proceeds of the sale of public lands. There has been obtained from the disposal of public lands in the 12 years succeeding the passage of this act, the amount of over \$80,000,000 which, as just stated, has been

expended in building large reservoirs, mainline canals, and the distributing systems designed to bring water to about 3,000,000 acres. Of this, about 1,300,000 acres have already been provided with water, and over half of this area has been irrigated with a crop return in 1913 of over \$15,700,000, as shown by the accompanying table.

Acreage cropped and irrigable and *value of crops, 1913*, by projects.

State	Project or unit	Acreage.		Crop value.	
		Cropped.	Irrigable*	Total.	Per acre cropped
Arizona.....	Salt River.....	161,642	170,000	\$4,552,879	\$28.17
Arizona-California...	Yuma.....	16,726	50,000	610,228	36.48
California.....	Orland.....	5,987	14,300	203,949	34.07
Colorado.....	Uncompaghe.....	30,366	48,000	995,153	32.77
Idaho.....	Boise.....	50,865	207,000	830,314	16.32
	Minidoka.....				
	Gravity.....	36,879	115,600	593,105	16.08
	Pumping.....	29,362		543,347	18.51
Montana.....	Blackfeet.....		26,649		
	Flathead.....	4,579	42,400	53,846	11.76
	Fort Peck.....	410	4,970	1,960	4.78
	Huntley.....	15,798	28,805	464,697	29.35
	Milk River.....	2,459	12,800	24,004	9.76
	Sun River.....	6,807	16,346	105,564	15.51
Montana-N. Dakota	Lower Yellowstone...	7,410	36,578	101,587	13.71
Nebraska-Wyoming..	North Platte.....	54,306	91,475	786,621	14.40
Nevada.....	Truckee-Carson.....	42,943	52,039	555,007	12.92
New Mexico.....	Carlsbad.....	12,195	20,261	257,274	21.10
	Hondo.....	803	1,000	14,236	17.62
New Mexico-Texas...	Rio Grande.....	26,720	27,723	679,271	25.40
North Dakota.....	N. Dakota pumping:				
	Buford-Trenton.....		4,050		
	Williston.....	1,686	8,047	38,888	23.06
Oregon.....	Umatilla.....	3,033	16,652	84,078	27.72
Oregon-California...	Klamath.....	18,928	28,904	288,189	15.22
South Dakota.....	Bellefourche.....	32,568	65,868	355,380	10.91
Washington.....	Okanagon.....	2,736	10,084	86,438	31.59
	Yakima:				
	Sunnyside.....	46,230	80,658	2,820,786	61.00
	Tieton.....	12,595	34,000	422,950	33.60
Wyoming.....	Shoshone.....	18,178	41,172	262,464	14.44
Total.....		642,216	1,255,381	15,732,215	24.50
1912.....		539,934	1,205,236	13,825,369	25.60

*Area service could supply.

When the Federal Government entered the field, nearly all of the easy irrigation projects had been taken up and many complications existed, because of this fact. The field was not a clear one, but on the contrary, many vested rights already existed, and in many cases the problem of reclamation involved not merely engineering features, but inter-state, international and legal complications, some of very far reaching nature. Even under these conditions, the progress has been rapid, and the results have justified the wisdom of the advocates of the law.

In this work, three stages may be distinguished, the first of survey and examination, the selection of various alternative projects, and the development of plans for these.

This work was practically accomplished in the first four years, 1903 to 1906. Then came the period marked by a rapid construction, during which many difficult engineering feats were performed, and a high standard of excellence obtained.

Next came the present and most difficult stage, namely that of operation and maintenance of the works, and the development of the agricultural lands, involving the dealing individually and collectively with thousands of would-be irrigators, the putting of these settlers or families on their feet, and the making possible the creation of thousands of self supporting farms, covering the widest possible range of human activity. The settlers, when they arrive, as a rule, have little experience and less capital. Many are very enthusiastic individuals who have made little success at home, but who are drawn by the hopes of acquiring a competence in a new country. Few of them appreciate the difficulties of subduing the soil, enriching it, and producing valuable crops, or the importance of working up these raw products on the farm, utilising their labour to the best advantage, and in joining together to secure the best markets. Progress in this direction, as might be expected, is far slower than in the initiation and building of the works themselves, and in many respects development must be a matter of slow growth, one of gradual transfer from the farm to other occupations, for those who are unsuited for the farmers' life, and the slow replacement of these by men with, perhaps, less enthusiasm, but more stable qualities of energy and thrift.

The settlement of the irrigated lands, the slow building up of the farms, and the development of business methods and of markets, while less picturesque than the construction of reservoirs and canals, is really the great work, and one in which the greatest experience, energy and tact are required. Progress along this line is being made, and the recent reports from all parts of the irrigated regions indicate for 1914 a decided improvement in crop area and production over 1913, and everything points towards a still more successful season in 1915. The inevitable reaction which followed the completion of some of the larger works is, in turn, being succeeded by an increase of the optimistic spirit, so characteristic of western pioneers, and from all sides come testimonies to the effect that whatever disappointments may have been experienced in the past, the future holds bright promises and one based upon the solid foundation of actual attainment.

Mr. President. Ladies and Gentlemen, I thank you. (Applause).

The Congress then adjourned until 9.30 a.m., October 6, 1914.

FOURTH SESSION

TUESDAY, OCTOBER 6, 1914

9.30 o'clock a. m.

The Fourth Session of the Congress was opened with President Young in the Chair.

PRESIDENT YOUNG: The Congress will please be in order.

The Secretary has several announcements to make and several messages to read to the Congress.

SECRETARY HOOKER: The attention of the delegates is called to the items on the next to the last page of the programme, "Notes for delegates", particularly that railroad certificates to be validated must be handed in to the registration head-quarters or to Andrew Miller, Secretary of the Board of Control, before noon of Wednesday, and all those who have certificates are particularly requested to hand them in. There may be some from nearby places who haven't attended to this, but everyone who hands his certificate in will help the others who come from long distances, in getting their rates.

Announcement regarding street car service read.

Announcement regarding entertainment of the ladies read.

The attention of the delegations from the states and provinces is called to the fact that they are expected to meet at the close of this morning's session, and organize with the election of a chairman and a secretary for the delegation. Also there are to be selected by the delegation from each state, and each province, an Executive Committeeman to serve during the coming year, and for the following Congress; an Honorary Vice-President, and a member to each of the three committees of the Congress; namely, the committee on credentials, the committee on resolutions and the committee on permanent organization. It is suggested that sometime during the morning, members from each delegation send up to the Chair an announcement of where the delegation will meet. It is customary for the delegations to meet following the session either at the state standard, or on the platform, or on one side, according to the delegation or the wishes of the delegates. There is one notice already here. It is from the Colorado delegation, stating that they intend to meet at the Palliser Hotel after this morning's session. There is no room number given, but probably that has been arranged among the Colorado delegates themselves,

After the organization of the delegates, notice of the members of the committees and the Executive Committeeman and Honorary Vice-President should be handed to the platform as early as possible.

TELEGRAM FROM GOVERNOR LISTER

The following telegram has been received from Hon. Ernest Lister, Governor of the State of Washington:—



SWALLWELL DISTRICT EXHIBIT.

Olympia, Washington,
October 5th, 1914.

Richard W. Young,
President, International Irrigation Congress in Conven-
tion assembled,
Calgary, Alberta.

Please convey cordial greetings and best wishes from the state of Washington to delegates assembled at twenty-first International Irrigation Congress. I sincerely hope good results for reclamation throughout Western North America will follow your present meeting.

(Signed) ERNEST LISTER.
Governor.

A message has been received from Samuel Fortier, Chief of the Irrigation Investigations of the United States Department of Agriculture, as follows:

MESSAGE FROM SAMUEL FORTIER

Washington, D. C.,
October 1st, 1914.

President and Members,
International Irrigation Congress.
Calgary, Alberta.

Gentlemen:—

It is to me a matter of deep regret that I cannot attend the twenty-first meeting of the International Irrigation Congress to be held next week in Calgary, Alberta, but although necessity compels me to remain here, I am consoled by the thought that the best endeavours of our technically and scientifically trained force are directed along lines of work in which you, as delegates, are directly interested. It may interest some of you to learn that the irrigation investigations of this department so ably conducted for years by my predecessor, Dr. Elwood Mead, are being continued over a broader field, and under larger appropriations from the Congress of the United States. We do not aspire to anything so ambitious as the building of large structures for the retention and conveyance of water for irrigation. Our humbler task is to help those who are making good use of the water, for the purpose of increasing the productivity of arid and semi-arid lands.

In their desire to build irrigation works, which may be said to have become epidemic in this country during the decade from 1902 until 1912, promoters, as well as statesmen, overlooked the important part performed by the settlers under such systems. It was not until large areas had been included in irrigation projects, and vast sums had been expended on the construction of works to provide water supplies, that men began to realize that there could be no revenue from such investments without an adequate number of reasonably prosperous settlers.

Some indication of the actual condition of affairs was disclosed by the census of 1910, which showed that approximately fifteen million acres were irrigated in 1910, that five million acres more were ready for irrigation, and that an additional area of twelve million acres was included in partially completed projects. The total cost of works to irrigate this total area of thirty-two million acres was estimated at \$424,000,000.

Large as this amount may appear to be, it forms less than one-half of the total cost of irrigation. According to estimates made by members of this force, the expenditures incurred by settlers in removing worthless desert growth, grading the

surface of the land, building the necessary ditches and structures, and otherwise preparing their farms for profitable returns, varies from \$9 to \$19 per acre in the various Western States. By applying these unit costs to thirty-two million acres, the area included in completed and partially completed projects, an aggregate cost of \$443,000,000 is indicated, of which less than one-half was expended in 1910.

It is thus manifest that much of the capital which has been invested in irrigation work in the past dozen or so years is not well secured, so long as from twelve million to seventeen million acres of the lands which have been provided with water remain unoccupied and unused for lack of the right kind of settlers.

It is also manifest that the settlers who may be induced in time to establish homes on this vast area cannot, without substantial assistance, and the privilege of long term payments, put their farms on a paying basis, and at the same time meet the cost of the water and land.

In the foregoing brief statement, I have called your attention to what seems to me to be the greatest needs of the arid West, in the hope that your body may find some solution for so grave a problem.

Sincerely yours,

(Signed) SAMUEL FORTIER.

Chief of Irrigation Investigations,

Office of Experiment Stations,

U. S. Department of Agriculture.

(Applause).

PRESIDENT YOUNG: We have the pleasure of having with us this morning Mr. F. H. Peters, the Dominion Irrigation Commissioner, who will address us on the subject of the Dominion Government Laws respecting irrigation in Western Canada. I have the pleasure of introducing Mr. Peters.
(Applause).

Address by

F. H. Peters

Canadian Commissioner of Irrigation

THE DOMINION GOVERNMENT LAWS RESPECTING IRRIGATION IN WESTERN CANADA

Mr. Chairman, Ladies and Gentlemen:

The subject of this address dealing with the laws respecting irrigation in Western Canada must necessarily be a somewhat dry subject, and the discussion on it will not be very easy to listen to, so that in commencement, I would explain to you the reason why this subject has been chosen.

Western Canada, in which I mean to include only Alberta and Saskatchewan, and not the real Western Canada which lies to the west of the Rocky Mountains, is still a very young country and has not yet reached the stage where we can claim more than about two inhabitants per square mile of our territory, and so we are standing with our arms open to welcome as many new home seekers as we can persuade to come over here. We know that Nature is not going to take away from us the great fertility of our soil, the long hours of sunlight and warmth during our growing season or the plentiful supply of water in our streams, and as this Congress is primarily interested in irrigation farming, I want to try and tell you in general terms, of the laws in existence here, which will at the same time control and assist those irrigation immigrants whom we hope to welcome over here in the next few years, in combining the great potentialities of our soil, our sunshine and our irrigation water, in establishing new Canadian homes.

About thirty years ago, this western country was opened up by the construction of the Canadian Pacific Railway, and at that time, irrigation was not thought of as a factor in the development of these great western plains. A few years later when the climatic conditions of these more westerly plains were better understood, and following a number of dry seasons which were experienced here, the idea was conceived that a great opportunity existed of augmenting the fertility of some of the favourably located lands by the application of irrigation water. It will be of interest to know that the two gentlemen who were mainly responsible for urging this idea are both present with us here to-day, Mr. William Pearce and Mr. J. S. Dennis. Within the next year or two, this question was considered and studied, resulting in the passage of the North West Irrigation Act in 1894, which Act was amended from time to time, and finally in 1906, when the old North West Territories were divided into the provinces of Alberta and Saskatchewan, revision was made, and the Irrigation Act re-enacted by the Dominion Government practically as it stands to-day.

In 1898, the Irrigation District Ordinance was enacted by the then Territorial Government, which ordinance enacted that farmers of irrigation districts, after acquiring water right under the Irrigation Act, could pledge the land in the district as security, and sell bonds for the construction of the necessary works to irrigate the lands in the districts farmed. This ordinance was never taken advantage of to any great extent and was never re-enacted when the Territorial Government lapsed in 1905.

All laws dealing with the use of water on the continent of America are necessarily much alike in many respects, and as time will not permit me going into the close details of our Irrigation Act, it will be my endeavour to bring out only the

main or exceptional points in our Act. It should here be noted that while this law is called the Irrigation Act, this is somewhat of a mis-nomer, as the Act really controls the use of all surface waters, not only for irrigation, but also for all other uses, except power,

The Irrigation Act applies to the provinces of Saskatchewan and Alberta, and to the North West Territories excepting the northerly provisional districts of MacKenzie, Franklin and Ungava.

At the time when the Irrigation Act was first discussed, that is about 1892, irrigation was quite old in several states of the Union where climatic and other conditions existing, were quite similar to our own conditions here. It was natural, therefore, as a basis for our own Act, that a very close study should be made of the laws already existing in the states, which was done, and this opportunity was undoubtedly of immense advantage to the Canadian officials who were responsible for the framing of our Act, as they were enabled to profit not only by the very many good points existing in the several laws, but also to take special pains to guard against the bad points such as had been proven by actual experience.

The good points which were taken from the existing laws in the United States were legion, and the four bad points which were specially noted to be guarded against were as follows:— First—, the many disputes which had arisen owing to the irrigation schemes which claimed water under the new doctrine of beneficial use, while at the same time, the older doctrine of riparian rights was still in existence.

Second—, the confliction which had necessarily arisen on inter-state streams where water rights had been granted by one state, irrespective of rights which existed or which might exist in another state through which the same stream flowed. Third—, the great many financial failures which had occurred owing to irrigation schemes having been promoted and financed where no adequate supply of water was available for the proper irrigation of the land, and,

Fourth—, the great difficulty of obtaining a good title to the water right on which the company expected to operate its scheme.

The most pronounced feature perhaps of the Irrigation Act, is the total suppression of all riparian rights and that clause which specifically states that the property in and the right to the use of all surface waters is vested in the Crown, and the further statement that no person shall divert or use any surface water excepting under the provisions of the Act. This throwing aside of the Old English Common Law doctrine of riparian rights and the acceptance instead thereof of the new doctrine of beneficial use, was a most advanced piece of legislation, but at the same time, the Act which suppressed the

old riparian rights made most ample protection for the rights of all riparian owners. In fact, under the terms of the Act, all riparian owners still retain the first right which they had under the older doctrine for such quantity of water as they may require for their domestic use, excepting that such works as they may construct for the diversion of any water for this purpose must be approved under the Act, and inferentially, this allows of a record being kept of the quantity of water which they will take for their use, and this is very desirable for administration purposes.

As just mentioned, the right to the use of all surface waters is vested in the Crown, so that this immediately does away with any possible inter-provincial disputes on any streams which run through the two provinces. Owing to the fortunate geographic boundaries of the two provinces, the Rocky Mountains create a barrier on the west, and outside of the northerly and easterly limits, the climate is not such that irrigation will ever be practised to any great extent, so that the only place where difficulties can arise, owing to political boundary lines, is along the international boundary, and it may be incidentally be said that provisions regarding these streams have been agreed upon in the International Waterways Treaty, which went into effect in 1910.

In order to ensure that the water will always actually be available for the fulfilment of all water rights granted, the Act empowers the Minister of the Interior to provide for the measurement of the quantity of water in any stream or other source of surface supply, and to stipulate the duty of water; the Act also provides for what is virtually a central recording office with the Commissioner of Irrigation, of all water rights which have been granted and all stream measurements which have been made, so that a balance sheet is always obtainable showing the available quantity of water in any stream, and also the quantities already granted, and thus guarding against the over-appropriation of any stream. The data regarding the quantity of water available in any stream, and as based on stream measurements, cannot of course be trustworthy until the measurements have been carried on over a long series of years, but fortunately under the administration of the Act, the development of irrigation schemes was not so rapid in the early days as to soon approach the point where it became a critical question to balance up the water rights already granted and the total quantities available, and since 1908, a very thorough system of stream measurements has been carried out over practically the whole of the two provinces, so that at this time, when the critical cases are commencing to appear, the records of stream measurements are sufficiently trustworthy to allow of a good administration, and the policy has been adopted that where doubt exists, that decision will

always be made on the side of safety, and a considerable number of applications have been refused on streams where the water supply is critical, pending such time as further measurements can be made to more fully develop the exact quantities of water available.

From the difficulties which had arisen in several states of the Republic, it was realized that the desirable condition would be for a person to be able to obtain as good a title for his water as he could for his land, and it was therefore endeavoured in framing the Act, to provide for the granting of as clear and indisputable a title, as possible, to the water. On complying with the terms of the Act, the person is given a government license for a definite quantity of water, and each license must be absolutely fulfilled before any inferior license is allowed to take any water. Following out the doctrine of beneficial use, however, the use for which the water is granted is specifically mentioned, and also the license is made appurtenant to the land whereon the water is to be used, and may be cancelled for, and only for, the abandonment of the use of the water. A matter of perhaps less importance, but one which has cleared away a great deal of misunderstanding, is the definition by the Act that the units of measurement of the rate of flow of water and the quantity of water, shall be respectively the second foot and the cubic foot or acre foot.

Certainly the most striking, and one of the most important features of the Act, is the very wide powers that are conferred on the Minister of the Interior, who, throughout the Act is stipulated as the high executive officer of the Crown, having almost unlimited powers to stipulate the interpretation that should be put upon the Act and to act practically in the sense of a sole arbitrator. This extreme power of one executive officer has received wide attention and has been criticised, it being pointed out that the proper carrying out of the Act in its true spirit depended almost entirely upon the integrity and ability of the Minister of the Interior, to control all these matters upon the advice of his subordinate officials. It may, however, be said that so far, this provision has worked very well and undoubtedly tends to keep many cases out of the courts and thus obviate vexatious and unnecessary delays which have commonly been the case in many of the states where the same judicial powers have not been conferred upon any executive officer.

The Irrigation Act, controlling as it does the use of water for practically all purposes, it is necessary to stipulate the various uses for which water rights are to be used, and the following classification is indicated in the Act.

Domestic—which includes household and sanitary purposes, and all purposes connected with the watering of stock and the operation of agricultural machinery.

Municipal—which includes all purposes for which water is used in any City, Town or Village.

Industrial—which means the operation of railways or factories by steam.

Irrigation—

Other—such as may not be specifically included in the first four classifications.

The specific manner in which water licenses are granted, and how afterwards the actual diversion of water is controlled, is of course, of great importance, so a few words will be said explaining how this is carried out. The records of stream measurements show the total quantity of water which may be available after comparison with the register of licenses already granted, and using the data gained by the stream measurements, the minister is empowered by the Act to define arbitrarily, the stage of flow in any stream which is divided as to low, high, or flood stage of flow. The Act also empowers the Minister to establish at any point or points in any stream, gauge rods marked so as to indicate whether the stage of flow is low, high or flood. Every licensee who constructs a ditch is required to place in it a rating flume and a gauge rod so that the rate of flow through his ditch at any time can be seen immediately by reading the gauge rod and referring to the government rating table of the flume. A license is issued covering a total quantity of so many acre feet and also it is stipulated the rate at which the diversion may be made according to the stage of water in the stream. As a matter of control therefore, during the operation of the ditch in any season, a glance at the government gauge rod in the stream will determine whether the ditch has any right or not to divert water at any time according to the stage of flow, and secondly, reference to the ditch rating station will show whether the rate of flow to which the ditch is authorized at any certain stage, is being exceeded or not.

The Act provides for a very complete record being kept of any scheme by the filing of plans and other documents, and the procedure in this respect can most easily be explained by running through in order, the steps that it is necessary to take in order to get a license under the Irrigation Act. A person who desires to acquire a water license is required to file with the Commissioner of Irrigation, a memorial, containing full information as to the location, character, and estimated cost of the works and the location and character of the lands to be irrigated. After this has been done, an office study is made to determine whether any supply of water is available for the scheme, and later, a preliminary survey is made by a departmental engineer, to determine whether the scheme is practicable and the suitability of the land for irrigation. The next step required is the filing of plans by the applicant, which

includes a general plan showing the source of supply, the layout of the ditches, dykes, reservoirs, etc., and the area of land on which it is proposed to apply the water, and also detailed plans showing the dimensions of the various structures which are necessary. After the plans and all other information is available, a decision is reached by the Commissioner as to whether the application should be granted or not, and if so, before any further steps are taken, the applicant is required to give public notice of his scheme for at least six successive weeks in a local newspaper. This gives everybody an opportunity to protest against the application if they desire, and all protests of this kind are most carefully investigated. At the expiration of the publishing of the application, and the inquiries into any protests which have been made, the applicant is authorized by the minister to commence the construction of his works, being given a certain length of time in which to complete the construction. In many cases, right of way for ditches or other works is required over land not owned by the applicant, and the Act stipulates certain provisions under which right of way may be expropriated, if it cannot be gained by private treaty, and right of way is always granted over vacant Crown land free of any charge. During the course of the construction of the works, periodic visits are made by government engineers, who inspect the progress of the construction work, and if it is deemed necessary, the original time which was stipulated for the construction of the works may be extended by the minister. After the works have been entirely completed to the satisfaction of the Commissioner, and all other matters, as for instance, regarding right of way, have been completed, a certificate is issued setting forth the facts, and based on this certificate, a license is issued to the applicant by the minister, for the quantity of water to which he is entitled, based upon the area of land to be irrigated, and the government duty of water. The only fee charged by the department is \$10.00 for the issue of the water license.

It has been found in many cases that when the applicants are homesteaders or farmers without any means, that it has been difficult for them to get the necessary general and detail plans made by a competent engineer, and in order to assist these persons, the department has adopted a policy of having the necessary surveys made and the plans completed for the farmer, for which he is charged the exact working time of the engineer or draftsman, which is of course a much more reasonable charge than any private engineer or surveyor could afford to do the work for. During the course of construction of the works and at all other times, the services of the departmental engineers are always at the disposal of the farmers for advice on any points in connection with the carrying through of their scheme.

In the case of the applicant being a large irrigation company, the requirements for the filing of plans and other information is somewhat more elaborate. In such cases, it is necessary to set forth in the memorial such information as the names and addresses of the directors of the company, the amount of the subscribed and paid up capital, etc. More elaborate plans are also required in the case of these larger projects, and in every year following, the company is required to file with the department a comprehensive statement of its financial and other operations, and all by-laws, regulations, agreements and tariffs, to be put in operation by the company, must be submitted and approved by the minister before coming into operation. It may be stated in general that with the large irrigation companies, the Act provides that the government shall be in a position to examine the application not only from an engineering standpoint, but also as a business venture, which will always tend to prevent the promotion of any purely speculative companies, and in addition to this, careful scrutiny before the applications are granted. The most complete supervision and control is afterwards provided in order that the best interests of the water users of such a company may always be adequately protected by the government.

The Minister of the Interior, under the authority which is given him by the Irrigation Act, has prescribed regulations for the administration of the Laws as laid down in the Act, and the following points which are important and pertinent are noted. The Duty of Water has been fixed as two acre feet per irrigable acre per annum, and the irrigation season has been stipulated to include the five months from the first day of May to the last day of September. With reference to the latter regulation, it may be said that where large reservoirs exist which would naturally be filled up during the late fall or early spring, that in these cases, special provision will undoubtedly be made by the Minister of the Interior to allow of the diversion of water into these reservoirs during periods outside of the stipulated irrigation season.

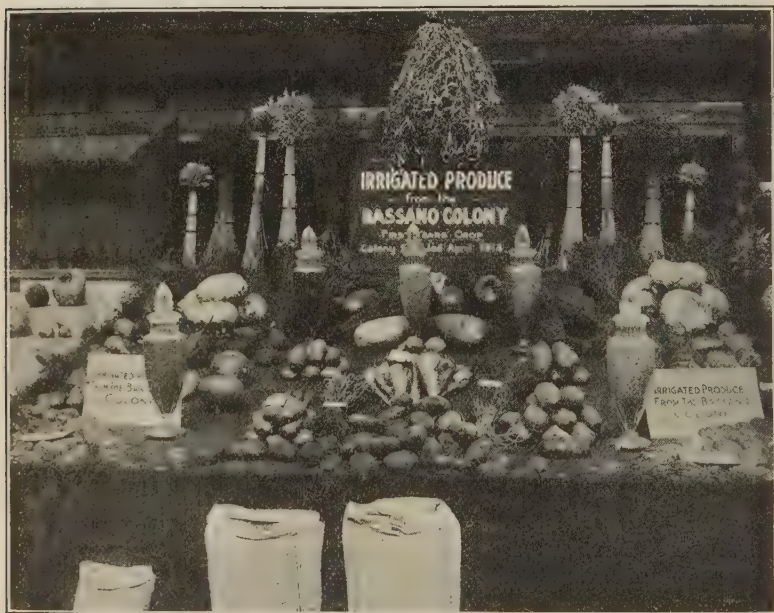
Another regulation prescribed is one defining the manner in which vacant Crown lands forming sites suitable for reservoirs will be leased to applicants in connection with any irrigation scheme. For the use of these reservoir sites, the applicant must pay a small annual rental charge, and the life of the reservoir lease is made dependent upon the life of the government license which the applicant holds for the diversion of the necessary quantity of water. Further regulations are in existence setting forth certain rules which must be observed in using any natural channel for the carriage of water from a reservoir or from the source of water supply to the reservoir.

During the period within which the Irrigation Act has been enforced, Western Canada has received a large immigration, and the usual manner in which these settlers took up their land was under the Homestead Act, where, generally speaking, each settler was given one hundred and sixty acres of free land. At the same time it was deemed advisable to create regulations under which favourably located lands could be purchased for reclamation by means of irrigation, or in connection with any system of irrigation works. Under these regulations, a very large number of settlers have acquired lands which could be easily irrigated from the smaller streams, and two of the large companies, each irrigating or proposing to irrigate in the neighbourhood of two hundred thousand acres of land, have also taken up this land under the terms of these regulations with special Orders in Council authorizing the particularly large sales. A short description of these regulations will be of interest, and while the regulations which are in existence to-day are being quoted, it may be said that these are practically the same as the first regulations which were issued some years ago, excepting that the price to be paid for the irrigable land acquired has been raised, at the same time, the proportion of irrigable land to the total amount sold has been slightly reduced.

The areas in which these regulations are in force include all of the first twenty-eight townships in the province of Alberta. In the province of Saskatchewan, the area is defined by the northerly limit of the first twenty-eight townships covering about one-third of the westerly portion of the province, and from this point, the area is roughly defined by a line running approximately south-east, and striking the international boundary at a point about seventy miles west of the inter-provincial boundary between Saskatchewan and Manitoba. The regulations stipulate that no agreement of sale for these irrigable lands shall be made until the purchaser shall have first received authorization for the construction of the works under the ordinary provisions of the Irrigation Act, and finally, the actual sale of the land is conditional upon the completion of the irrigation works to the satisfaction of the Minister of the Interior. The sales are made at a rate of five dollars per acre, subject to a reduction of the cost of the irrigation works as certified by the Commissioner of Irrigation, up to an amount not exceeding two dollars per acre, and the payment for the land is made in five equal annual instalments, the first of which becomes due sixty days from the date upon which the sale is authorized. As practically all of the irrigation works constructed cost not less than two dollars per acre, the actual cost to the farmer of the land, is practically three dollars per acre, and in some cases more, according to the amount of work that it has been necessary for

him to do. Under the regulations, these sales of land are limited to an area not exceeding one section of six hundred and forty acres, and of this area, at least twenty-five per cent shall be irrigated, but in the case of any areas exceeding one section of land, the sale may be made subject to the approval of the Governor-General in Council.

In conclusion, it may be said that up to the present time, the Irrigation Act has proven very successful, and under its provisions, about 155,000 acres of irrigable lands have been taken up by small farmers in parcels ranging from one hun-



IRRIGATED PRODUCE, BASSANO COLONY.

dred and sixty to perhaps one thousand acres, the average being probably two hundred acres. In addition to this, three very large schemes comprising a total irrigable area of about 760,000 acres have been completed at this time, and one other large scheme, having an irrigable area of about 200,000 acres is nearly completed, with the construction at the present time temporarily held up. It must be admitted that owing to the fact that very few of the irrigation licenses are being utilized to their full extent, the conditions of demand and supply of water have not as yet become critical, but it may be said with pride that at this time, when the Irrigation Act has been in existence about twenty years, there has not as yet been any case which has been submitted to the civil courts in Canada.

(Applause).

MR. W. D. TREGO of Alberta: I just want to inquire if the Irrigation Act provides for an increase in the maintenance charge beyond the contract price which is provided for in a signed contract between the company and the purchaser, and, if so, how much?

MR. PETERS: I do not think the Act has anything to do with it. It is a matter of contract between the company and the water user.

MR. TREGO: Does not the Act provide that if the cost of maintenance is found to be more than the contract price, the price can also be increased by consent of the Minister of the Interior?

MR. PETERS: The Act does not say that any contract of that kind can be broken; there is nothing specific in the Act on that point.

MR. JOHN C. BUCKLEY of Alberta: When the government was framing this Act, was the primary object of the government the beneficial use of the water to the farmer in contra-distinction to the public companies? Is the Canadian Irrigation Act framed primarily with the view of the beneficial use of water to the farmer?

MR. PETERS: Mr. Buckley, the farmer is the man who uses the water entirely, so it must be for him that the beneficial use is anticipated.

MR. C. E. LAURENCE of British Columbia: If a homesteader of 160 acres requires water, will he be charged more than \$10.00? Is that an inclusive fee for the license?

MR. PETERS: The \$10.00 license fee covers the license and it does not matter if it is for 100 or 200 feet per second. If a man has two different intakes, he is of course given a separate license on each stream and is charged \$10.00 for it.

MR. LAURENCE: Thank you. May I ask why this Dominion Water Act was made only for Saskatchewan and Alberta, and British Columbia was not included?

MR. PETERS: At the time that this Irrigation Act was passed, British Columbia was already a province and already owned its own water. Alberta and Saskatchewan in 1894 were the North-west Territories and were under the control of the Dominion Government, and when they were made into provinces, the Dominion Government retained the water resources.

MR. LAURENCE: But Sir, the Dominion Government maintains the right to administer lands in the railway belt of British Columbia; why was that exempt or why should not that be included?

MR. PETERS: I am afraid that is on the other side of the mountains Mr. Laurence, and I could not answer that very well.

MR. LAURENCE: But I could not help thinking in connection with the address which you gave us, which you said would be a dry one, but which was very interesting to many of us in these water provinces, that the Dominion Act is so very complete and touches the very problems and difficulties which we are suffering under, and it occurred to me that we, in the Dominion belt of British Columbia, are not under it.

MR. TREGO: Mr. Peters, you spoke about the title being good. Why is it then that the loan companies refuse to loan a dollar on irrigable land?

MR. PETERS: Because land companies will not lend money on your land, it is not fair to take it for granted that the title to your water is not good. It might be due to a thousand other causes.

MR. TREGO: They give us the reason that land which is irrigable has no clear title and that the company selling the water has a lien on the land ahead of any mortgage.

MR. PETERS: That has nothing to do with the title to the water. In your case it is the Canadian Pacific Railway Company that is going to get the good title from the government, and you have an agreement with the railway company to get some of it.

MR. TREGO: But it seems to me to have a great deal to do with the farmer.

MR. PETERS: Do you claim that you haven't got a good title to the water?

MR. TREGO: If we had a good title to the land, we could certainly borrow money on it.

PRESIDENT YOUNG: Mr. Dennis suggests that you will have as soon as you pay for it.

MR. TREGO: We have tried to borrow money on land, the payments on which have been fully completed, but the loan companies always give that answer. I tried last spring to see if I could borrow money on a quarter section which had only five acres of irrigable land on the quarter, and the loan companies refused to loan it.

PRESIDENT YOUNG: We have had a further illustration—we of the United States—of what we expected, and knew before we came here, of the great wisdom that has been displayed in many of your laws. I recall the fact that a fellow townsman of mine, a few years ago, came back from British Columbia, where he had some mining property, and he told me that the rights of the owner of a mining claim were determined by the vertical boundaries of his claim, and that being the case, that there was little or no litigation in Canada respecting the rights of the owner of the claim to the ore under

a claim or the ore on any ledge within the claim, and that that fact has prevented litigation in Canada. With us in the United States, generally, a person owning a claim has the right to follow the ledge wherever that ledge may go, and you can readily see that that has been the source of a great deal of litigation.

We find also in your public system, you have provided that roads come out of the public domain around the boundaries of each section. That is a very wise provision which we have neglected, as far as I am acquainted, in any part of the United States, and now we find through the very interesting address of Mr. Peters that you have done a great many things in the way of irrigation legislation that we can well take notice of. You have, for instance, provided that some authority under the government shall prescribe the duty of water. As far as I know, that has not been done by law in any part of the United States, and that is a frequent source of litigation with us as to the precise amount of water required for any land. Generally with us that is left to a jury to decide at the end of a long and costly lawsuit. Your government here prescribes, after investigation, just what amount of water will be allowed by license for the irrigation of a tract of land. Also, you provide for the preparation of plans for the smaller projects by the government engineer at cost, which occurs to me to be a very excellent suggestion, and then you have done away with the Old Common Law doctrine of riparian rights, which exists in some of our states, but which, in my own state, that of Utah, we have abrogated as you have done here.

There are a great many items referred to here this morning, which it occurs to me we might very well take back with us to the United States and incorporate in our laws. You have been fortunate here in as much as you have a comparatively virgin country, and you have gathered experience from our mistakes and failures in the United States, and I am informed that Mr. Dennis spent months and months in visiting all or most of our irrigating states, and consulting our irrigation lawyers and practical experts, and that this statute is the result of that investigation, so that you were not hampered by many years of patchwork legislation, but you were able to frame in the beginning a well based Act on our experiences there.

Is there any further discussion?

MR. W. J. THOMPSON of Saskatchewan: I hold, Mr. Peters, in my hand, a dispatch from Saskatchewan, in which an officer of the Dominion Government states in regard to irrigation in Saskatchewan, that there are no irrigation schemes whatever, as far as he knows, in the province. As you have referred to some of the irrigation townships, will you kindly state, so that it can be made public, how many licenses have

been issued for the use of water in Saskatchewan, and approximately, how many acres have been surveyed for irrigation purposes?

MR. PETERS: Mr. Thompson, I could not give you any idea of the number of licenses issued to small private schemes, but there have been, approximately, 62,000 acres put under irrigation in Saskatchewan, namely, in the Cypress Hills district.

MR. D. W. ROSS, of California: Mr. Peters' discussion of the irrigation laws of the Dominion was very interesting, and I followed his description of the law with a great deal of interest, for I recognized in it essential features of the law of the state with which I am most familiar in the West, the state of Idaho. In Idaho, however, we made one departure from your plan here. We have no public officer who has the right to say that the use of water should be denied. We left that to the judgment of the applicant, and that is the constitution of the state. I think in that respect only does the law and the procedure differ from the system here.

I was interested particularly in the question put by Mr. Trego as to the attitude of loan companies, and I have not the least idea as to the position taken by the loan companies here or the history of that subject, or the relationship existing between the owners of these lands and the railway company, but there was a time in the state of Idaho when loan companies hesitated about making loans to farmers in irrigation districts, on the theory that the lien, which the district law imposed on the land, was a first mortgage and would take precedence over their mortgage, and that the land could be sold under the lien, and it took several years to make that plain,—to get them to understand that the situation was in no respect different from what it would be in the case of taxes, that the land could be sold with these taxes and they would have to protect them if the owner of the land did not protect them. Shortly after, however, they adopted the reverse policy, and they refused to take loans unless there were some taxes or other against the land. Now, perhaps you are passing through that stage here, and I would like to know, if you can tell me, why the loan companies take that position?

MR. TREGO: They take that position because they say that the tax on the land is the first lien.

MR. PETERS: I might explain to you a little, Mr. Ross, in the case of Mr. Trego. He is a gentleman who is on the Canadian Pacific Railway irrigated tract, and, in his case, he has an agreement with the Canadian Pacific Railway Company to get a certain quantity of water every year, for which he pays fifty cents an acre every year, and this civil contract makes that fifty cents an acre a first lien on the land. There is no doubt about that. As you have suggested, however, I do not

think there is any doubt that any reasonable minded man must appreciate the fact that the addition of a water right to any piece of land in this country, is worth more than fifty cents an acre every year, and I have the belief that the reason the loan companies will not loan money on irrigated land is a condition which is just here for the time being, because the system is new in this country, and there have been a good many people coming in, who did not understand irrigation, and did not go at it very well, and did not try very hard. Therefore irrigated lands are not held in such high esteem to-day as they should be, and as they will be in ten years time.

MR. TREGO: I would just like to say in answer to Mr. Peters' suggestion, in our particular district, the majority of our farmers are men from Utah, Idaho, Colorado and such states, and are men who have spent the greater part of their lives in irrigation before they came here.

MR. WILLIAM KIRKUP of Alberta: I would like to refer Mr. Peters to my own case. I have a quarter-section of land in the western section of the Irrigation Block, for which I have a clear title, so called, as far as the C. P. R. can give it, and I have tried most all of the loan companies in Calgary, and some in other places, to see if I could obtain a loan on this property, and in every case they have refused and upon the ground that in as much as the water right held a first claim upon the land—and that water right was considered of not one cent of value—it was holding the prior right and they could not loan any money on such property. Now, that is my own personal experience, sad to relate. This is my own experience also. I can truthfully say that I do not consider the water right in this locality to be of any value whatever, and to the extent of increasing the value of the land, I consider it a detriment. It seems to me to be so. At the same time I want to say that I am an old irrigator. I have spent thirty years of my life in Idaho, and have irrigated successfully, but in this climate, I have tried it and found it absolutely unsuccessful.

MR. BUCKLEY: I would just like to draw the attention of this Congress to something to which the government does not seem to attach much importance, and that is to put up such an arbitrary law as to settle our disputes by the Minister of the Interior. I don't mean to suggest anything about any person, but it is the principle that I mean. The Minister of the Interior, as everyone knows, and people holding corresponding positions, I suspect, in the United States, are prominent politicians, and therefore, they are not qualified to understand the difficulties and the disputes in matters pertaining to irrigation. If we can put men in that position whose advice we can follow, a man for instance who has been a practical irrigator and who can use the shovel in the field,

then he knows all about it, and it would be all right, but no matter how well disposed the Minister of the Interior may be, sometimes his subordinates are not qualified men, and they are politically appointed. Therefore I think there has been an evil allowed to creep in there. I think that all appointments such as that should be made from men in the field. I think that is a weak spot in the Irrigation Act.

MR. GEORGE WELLS of Alberta: Mr. Chairman and gentlemen: I have been here twenty-five years, and I am interested in this discussion, for the reason that seven years ago I was the first man to use irrigation water from the C. P. R. canal. I say I was the first man to use that water on a growing crop, and I find it a distinct advantage. I have been in business for twenty years as a market gardener, and there is no question to my mind but that this is an irrigation country, and the man who cannot make fifty cents an acre additional profit on his land should go out of business. This is not land that should be used for raising oats. The land is too valuable for the crops that are being raised on it. When I was a boy in England, we raised fifty and one hundred acres of roots, and fed them to stock. This land was rented land, and the fixed charge was two and a half to twenty-five dollars for rent. Those farmers paid that rent, and they bought fertilizer, and everything. The labour was not much, but, of course, the labour does not amount to so much in England as it does here. In England we used to have to spend three or four pounds per acre trying to get rid of flies and bugs. I grow potatoes here, and have done for some years. I am fifty-one years of age and I have not yet met a potato bug. If I were to meet one I should have to be introduced to it.

What I want to say is that this is too good land for oats and wheat; let them grow roots and make money out of them feeding them to their stock. Sugar beets cost six dollars an acre to grow, and they plant them twenty inches apart. I plant cabbages three feet apart, and then I go and bank them up. I wrote to the Industrial Commissioner, and suggested that we should have a sauerkraut factory, and they just laughed at me. I can raise cabbages of thirty pounds each if I wanted to. There is my experience of this country for twenty-one years, and if I were in business to-day and a young man, I would gladly pay a dollar an acre for water rights. Irrigation farming is modern farming and it wants modern men, and men who will use their brains. A man does not want to start weeding when he has to decide which is the crop and which is the weed. You might just as well sow these vacant lots with weeds, and expect to make the taxes of three or four hundred dollars a lot out of it.

MR. TREGO: Mr. Chairman, I would like to ask the gentleman what he would do with his market garden stuff if

we put the whole three hundred and fifty thousand acres of the irrigation block into that kind of stuff.

MR. L. O. ARMSTRONG, of Alberta: I have just been through that irrigated belt with a moving picture machine and an ordinary photographic machine. I have stood in the middle of the road and taken photographs on one side of me where water was used and on the other side of the road where water was not, and the difference would be equal to seventy-five per cent in favour of water. These pictures can be seen at the Ad Club Luncheon on Wednesday and any fair minded man will be convinced after seeing these pictures.

CHAIRMAN CASE: Gentlemen, in this great big broad domain there is room to grow wheat and oats and cabbages and potatoes and everything. As a pioneer of central Kansas forty years ago, these things had to be developed. I remember when eggs were not worth more than four or five cents a dozen, and when butter was a drug on the market, but down in the eastern central part of the United States now, a market has been created for all of these things, and there will be a market for sauerkraut in this country in a very short time.

(Applause).

MR. W. L. TOOLEY, of Texas: We are very glad to pay a water tax of three dollars per acre for water. I am in the loan business, and my loans are principally on farm lands. The fact is that a three dollar water tax, prior right, does prejudice the land against a loan. Where land is bought from private irrigation projects, where there is a prior lien against the land in addition to the water tax, that will prejudice it, and lands that are bought from private corporations building irrigation dams and ditches are not in good favour with loan companies on our side. I do not know what the conditions are here, but in our country the farm loan is the very best loan that we get. I believe that our farmers, if it came to a point of paying six dollars an acre for a permanent supply of water, or three dollars an acre for an insufficient supply, would rather pay six.

CHAIRMAN CASE: The time is up gentlemen. We have given you a good deal of extra time, and it is coming near to noon time. I am very anxious, as I know you are, to hear some announcements from the Secretary.

SECRETARY HOOKER: British Columbia delegates will meet at their own standard at the end of this morning's session.

Washington delegates will meet at their own standard at the end of this morning's session.

The meeting of the delegation from Alberta will be held at the Alberta standard at the close of the morning's session.

There has been received at the Registration Headquarters, at the Post Office, notice that the Canadian Northern Railway have a telegram for Peter Von Wegman. There was delivered at the Post Office this morning a telegram for Mr. H. W. Grunsky, or Mr. Rutherford. If neither one has obtained that telegram, it can be obtained by them at the post office.

CHAIRMAN CASE: It will be entirely unnecessary for me to introduce Mr. Dennis to you, I present him. (Applause).

Address by

J. S. Dennis

Assistant to the President Canadian Pacific Railway, Chairman
Board of Control International Irrigation Congress

COLONIZING IN WESTERN CANADA

Mr. Chairman, Ladies and Gentlemen:—

I have been called on this morning by the President of the Congress to fill in a gap. I had no intention of occupying the time of the Congress with any address and you will therefore note that my name was not on the programme. President Young intimated that probably I could say a few words to you this morning of the work of the Canadian Pacific Railway Company in connection with colonization in Western Canada, with the idea that some of the lines we are following may be of value to you. I had, perhaps, better preface my remarks by saying that in carrying out any big work of this kind, it is not possible to satisfy everyone. Difficulties are bound to arise, difficulties have arisen, and difficulties will arise. This is incidental to any big work. We can only hope that in the end they will be so solved that the greatest possible number will be satisfied.

The great work that we are confronted with at the present time in Western Canada, as was pointed out to you yesterday by Mr. Bruce Walker, is people flocking to our cities, towns and villages, because we have too many there already. He explained the procedure which is being followed by the Dominion Department of Immigration in their efforts to secure people, and the results that were obtained. He went on to elucidate and elaborate the system under which men obtained homes on government lands, and he made a very strong showing, no doubt from the standpoint of the homesteader, and the man who is looking for a free grant of land.

Now the Canadian Pacific Railway, the Canadian Northern Railway the Hudson's Bay Company, and certain other corporations who are land owners in Western Canada, have

had to take a part in colonization work, which has had to be based on a system of land selling, and naturally they have been confronted with a great many features which do not occur in connection with the colonization of land under a homestead system. I am not going to attempt to deal with the matter except in a very fragmentary way, because time is very limited, but I think possibly you would be interested if I were to outline to you the policy of the Canadian Pacific Railway Company and the systems they are following in their attempt to get people to come to these western provinces and to take up land.

The Canadian Pacific Railway Company was granted 25 million acres of land by the Dominion of Canada as part of the subsidy in connection with the construction of the line. They had certain conditions imposed on them under the statute, in connection with these lands, but on the other hand they were given the right to exclude within a belt twenty-four miles on each side of their main line, from the eastern boundary of Manitoba to the summit of the Rocky Mountains, such land as they considered was not fairly fit for settlement. That was a somewhat ambiguous term, but under that provision they did not take as part of that land grant, practically any land from here through to middle Saskatchewan because at the time it was not considered fairly fit for settlement. Why? Because, at the time of construction they did not consider that territory fit for settlement owing to the climatic conditions. However, they were given land elsewhere to make up for that deficiency and ultimately obtained the full 25 million acres.

In addition to this 25 million acres, they were given 25 million dollars, but of course that money did not go very far, so they tried to raise money on the land. That was in 1882; not so very long as time goes, but a long time, of course, in considering the development that has since taken place. They could not raise any money on it at all. There was not anyone who would loan them fifty cents an acre on it, and finally the Dominion Government came forward and made them a loan on a certain portion of it. I am simply giving you that fact to illustrate the conditions. Now they had this land and they had built a trans-continental railway and there was no one here. The railway was no good without people on the land and they then began an active campaign to get people to come and settle. They advertised in Great Britain, Europe, and the United States, and they kept it up. They practically did not get anyone and there was practically no settlement of any marked character took place for very many years after that.

There was no great movement to these western provinces till when? Till the people began flowing over the line which separates Canada from the United States; till your people

down there had grown to that number and your free lands had diminished to that extent that your surplus population floated across here and we got a certain number. That immigration began not more than ten years ago and it has swelled up till, as Mr. Walker told us yesterday, it has reached 200,000 in one year. We have been doing everything we could to stimulate that movement. We have been doing it for the purpose of colonizing these lands. Up to nine years ago, the average price at which the Canadian Pacific Railway were selling lands in Western Canada was \$3 an acre. That value has increased, owing to the demand and the incoming people, and the average price to-day of dry land is practically \$10 per acre, and choice land is much more than that. A very large number of people have been brought into this country, through the government agencies, and we hope that we have done our part in encouraging people to come.

Up to two years ago we were in the land selling business. We wanted people. We were land sellers, we were not purely colonization agents. We had a large number of agencies throughout the United States and Northern Europe and Great Britain, advocating this country as a country suitable for home-making and stating that we had land for sale. We did a business running to as high as a million dollars a month in certain years. That was not getting farmers, that was land selling. We can go out despite the adverse conditions existing to-day and in a few months sell the whole of the land that we have left. We were doing that work up to two years ago. It is true that at that time we had a form of contract under which we sold land giving a man special privileges if he would occupy it, but the vast majority preferred simply to hold the land without occupying it or improving it. We realized that while it was an easy matter to sell land, it was a difficult matter to get people, and possibly harder still, to keep them when we had got them. I am going to be perfectly frank with you about this. You may have gathered, a few moments ago, that there is a certain amount of dissatisfaction in certain portions of our scheme. There is no man in this hall who for one moment considers that an individual, a corporation or a government can sell lands without having trouble. That is not possible.

Two years ago we realized that we should stop selling and should attempt to colonize and for that reason we changed our policy, and since that date we do not sell a single acre of land without an obligation on the part of the purchaser to occupy and improve it. I am speaking now generally about dry land. To encourage him to do that we give him twenty years in which to pay for it. He makes a payment of one-twentieth, and the balance is divided over nineteen years with six per cent. interest on the deferred payments. Realizing that in a great

many cases, it is impossible for him to provide his own improvements, and that as long as he holds the land under contract with us and the title is not vested with him, he cannot raise any money from a loan company, we undertake to advance him \$2,000 as a loan, to be used in constructing his house and his barn, his well and his fences. We do not give him the \$2,000 to do that; we have certain standard plans of houses and barns, and so on, from which he can select what he wants. We will undertake to construct them for him at a certain price, or, in certain cases, he can do his work, and we will advance him the material. In any case, he gets a loan of \$2,000 for his improvements. That loan is added to the price of the land and extended over twenty years. In other words, he gets a loan of \$2,000 spread over twenty years, at six per cent. interest.

Those of you who come from Western America and who have spent any time in it, know, as I know, after having been forty-two years in this western country, one of our great troubles has been grain production in the early stages of the settlement. It is incidental to any settlement, in any new country. Grain crops, if successful, are very successful. If the crop is good and market is good, they realize a large amount of money immediately; therefore, the first effort of the farmer all through Western America, beginning in the state of Ohio, was grain-growing, and that extended to our western provinces, until we have to-day in Western Canada, very few farmers. We have a large number of grain growers, but we have very few farmers. We are in the same conditions as the state of Minnesota, and the southern part of the state of Wisconsin were in their early days. Grain mining was the occupation of those on the land, and not farming. To try and get away from that, if it was possible to do so, and for the purpose of encouraging more extensive farming, and more stock growing, in certain selected cases, we agreed to advance him \$1000 worth of live stock, cattle, sheep and pigs, so as to get him started off in the right direction, putting him in the position to produce what he requires himself, and to have a more diversified interest. If the grain failed, he would have his cattle, and if the grain was good, he would have a balance in any case. That is the general policy we are following now in what we call colonizing.

In this vast district through which the main line runs, that belt twenty-four miles on each side of the railway, and which the Canadian Pacific Railway Company refused to take, it being unfairly fit for settlement, but after having been granted the land in lieu of that which they had rejected elsewhere in these territories, there was still a balance due them, and finally they agreed to take 3,000,000 acres of it, lying east of this city. That is the area which is to the east of us here, which we are

now irrigating. There is a further project south of this city which was not owned by them at that time. In this large block, we undertook to construct irrigation works to carry water to the land. Perhaps we were mistaken, however, we went ahead in good faith, and said that we would put in this irrigation project. The irrigation project was put in, and it covers this irrigation block of 3,000,000 acres. We have expended or will have expended when we get through with its construction, about \$16,000,000 on this scheme; possibly we were wrong in doing it, however, it is done. We have been attempting to colonize in that block, first under the old system, simply with the sale of land, without any obligation to occupy or improve it, and now we are colonizing wholly on the new system, to occupy and improve.

We have had fairly good results, and in the western section we have a large number of first-class people. They have not had the success they expected, or the success we had hoped for, by any means. They have met with difficulties and crop shortages, and bad weather, and the usual troubles which arise as between a large number of people on a scheme of that kind, and those who administer it. You have already heard it said by a gentleman from south of the line, and particularly by Director Newell, the head of the Bureau of Reclamation, with regard to the many large schemes which the government of the United States has in hand, that they have had somewhat the same trouble. It would be absolutely absurd to suppose that any large irrigation project could be built anywhere and that everything would go successfully from the first. It has not gone smoothly with us, but we are in hopes that after a time these difficulties which have arisen will be adjusted on a fair basis, and that we will be able to go along smoothly. We have invested a large amount of money, with the idea that irrigation is required, and will produce good results, and we hope in the end to be fairly near the mark.

Now, our general colonization policy applies to this irrigation project as well as to our dry land, but finding there was a certain class of settler whom we wanted, who was not disposed to pioneer, who did not want to leave a home in Great Britain or Northern Europe to come out to this country to live in a sod house or a tent, we extended our system further by what we characterized as the "Ready Made Farm." This farm is improved by the construction of a barn, a house, a fence, and a well, and a certain area is put under cultivation, so that a man can come out and get off the train and within a couple of days, he is fairly well settled. A certain area is under crop, and he can devote his first year to getting himself in better condition and a larger area under crop, and he will start off further ahead than a man who goes in on the raw prairie. We have now about 500 farms of this description in

different colonies, groups of 30 to 40 farms, down to 12 or 15 and we have applied them to irrigated lands as well as to dry lands. Again we have not met with success in the sense that all the people put on these farms were satisfied. People have stayed on them and gone off them, and others have done the same, but taking it on the whole, that policy has worked out satisfactorily. Possibly we expected too much when we began. Well, its better to be optimistic than pessimistic, because it is optimism that has made this country.

Perhaps in all these schemes it is better to start off with optimism, knowing that inevitably, you will be disappointed. We were optimistic with reference to all of these schemes. We are not prepared to admit for a moment that we are going to fail in the end. We have fallen down in the number of people we expected to put on the land, and the number we expected to keep there; also in the returns that we expected to obtain from the immense amount of money in loan farms, ready made farms, seed advances and live stock advances, until we have to-day so many million dollars out in overdue interest and payments, that I am afraid to mention the amount, because it would not look optimistic. We have fallen down, and we always will, but in the end, we think, that the policy we are carrying out in putting a very considerable number on land in Western Canada where they will be able to make homes, will be a successful one. Now, let me emphasize right there "People on the Land that will make Homes." I said we had a vast number of people farming land in Western Canada, and a very small number of farmers. So we have, in this sense—we have a very small number of men occupying land as farmers, who are occupying it with this idea, that they will make a home there and obtain from this land a living and produce more than they consume, and that they will not expect, after being on the land two or three years, that they will be able to sell it at an enhanced value. That has been our trouble. We have expected that we could occupy land for a comparatively short time, and sell it at such an increased price, that we would make a large amount of money out of it, and, more than that, while actually farming the land over and above living out of it, we would be able to put a large amount of money in the bank. It never was done by farmers in any country. That is not the basis of farming or agriculture, as I see it. The basis, as I see it, in practically every province and state on this continent, and practically every country on the other side, is to make homes. A man puts into his farm a large amount of effort for which he gets no return in cash.

If the farmer ever had, has to-day, or ever intended to charge up against his farm, day by day, the value of his services, on a cash basis, farming would go out of existence. The farmer who has in view the making of a home in the sense

that he is going to improve his land and continue to do so, also his buildings, to purchase very little of what he and his family consume, to be able to pay his taxes, purchase what he requires, and have a small amount to the good, and, ultimately that the increase in value of his farm will give him something, when old age comes, he is farming. He is not land speculating, what we have all been doing in Western America, and what we are all doing to-day.

In a very fragmentary way, gentlemen, because I was not expecting to address you, I have complied with the President's request, that I should fill in the gap on this morning's programme by saying a few words to you on this subject, that is what we are trying to do. Our hopes are great, but they are absolutely conditional upon the success of the people. As far as we are concerned as a large railway and transportation corporation, not a land corporation, because we are only that incidentally, we are a transportation concern, extending from London England, to Shanghai, China, what we are going to get out of it is not what the land is sold for, in any sense, but what will ultimately be brought to the coffers of the company, in the way of traffic in and out. The success of every satisfied farmer is the success that counts. The number of dissatisfied farmers just discounts our success correspondingly. The farmer's success is naturally ours, because if we were purely a land organization, we could say good-bye as soon as we got the man's money. We are not in that position, because after we have sold all our land, we still hope to have trains running and steamships running, and our express system and telegraph systems going, our steamships on the Pacific; our hotel chain from the Atlantic to the Pacific, and at every one of these points the farmer is able to get back at us. He can say "I won't travel on your line; I won't ship my freight or my produce over your line; I won't send telegrams over your line; I won't stay at your hotel." That is how he can get even, and that is why we naturally want to have the farmer satisfied as far as we can possibly satisfy him. To expect that we can satisfy everyone is chimerical.

We are trying to carry on this work successfully and I think it will ultimately have a very great influence on Western Canada, and we will have in some small way, played our part along the line of creating homes, particularly on the land, because our development in the West has been along lines that are not parallels in any sense. We are away ahead of conditions, in our urban development, we have wanted to be away ahead, but there has to be a very considerable period of marking time in our urban centres before our agricultural development catches up. The basis of our ultimate success is dependent upon the settlement of our agricultural areas. We hope, that the work we have been doing, will assist in some

small way to that end. We propose to go on doing it as far as we can. As soon as this unfortunate convulsion is over in Northern Europe, we hope to extend our organizations over there, expecting that many will want to get out from under, and come over here and throw in their lots with us. We are not able to get from Great Britain any considerable number of people. We have had a large organization working there, but we are not able to get very many farmers. The reason is that Great Britain is not an agricultural country, less than thirteen per cent. of their population being engaged in agriculture. From Southern Russia though, Austria-Hungary, Germany, Belgium, Holland, Denmark, Norway and Sweden, we have always been anxious to get farmers and hope to get large numbers after the war is over.



C. P. R. EXHIBIT (COCHRANE.)

Mr. Chairman, I have given a very fragmentary outline of what we are trying to do. We do not hope to satisfy everyone, but if we can feel, when we get through with it, that we have played the game on the whole, and given everyone a square deal, may we hope that history will say, "They did their best."

(Applause.)

MR. GEORGE G. HUSER, of Alberta: I am bound to say that I am not an irrigator, but I was invited to come and attend this Congress. I have nothing against the C. P. R., nor anything against what Mr. Dennis has said. I have nothing against irrigation; in fact, I lived in the great state of Washington for twenty-five years, and I have seen the results of irrigation in the Yakima Valley, and I am living to-day alongside of the irrigation scheme, northeast of Crossfield, called the Crossfield Colony.

Now, I am not the owner of any of this land, and I am not directly interested in it, but I have a lot of neighbours there, and I would just like Mr. Dennis to explain and tell us what earthly chance these men have of ever winning out. They have rolling, heavy soil, and they simply cannot use the water, I have seen family after family coming and settling there, and their little savings swept away, and then, the company goes and brings in new settlers, and they go to the wall in the same manner. I am not afraid to ask Mr. Dennis to explain that.

MR. DENNIS: All that you say is perfectly true. We will keep at it till somebody does stick.

MR. F. W. BURTON, of Alberta: I would like to ask Mr. Dennis to state the terms on which his company puts men on these ready-made farms. I do not think he mentioned that.

MR. DENNIS: On exactly the same terms as other farms. The cost of the improvements, the house, the barn, the fencing and the well, are added to the list price of the land, and sold on a twenty year term, with six per cent interest.

MR. E. R. HENNEY, of Alberta: I have been in business over six years, and I haven't any land, but I wish to say this, that I have seen loans closed on land, whereby people that bought C. P. R. land were the best satisfied people in our district. I wish to praise them and to say that in my view, the C. P. R. has done more for the people in my district, than any other people in this country.

MR. R. G. WILLIAMSON, of Saskatchewan: I would like to ask Mr. Dennis if the Canadian Pacific Railway has ever taken the land away from any settler at all, that ever tried to make good.

MR. DENNIS: That's a pretty hard question to answer. We had twenty-five million acres of land, and we now have about six million, but the general policy laid down by the executive, and which I have no hesitation in saying has been carried out as a general thing, is that in the case of any man on the land who is making a home there, we never cancel his contract, and that has been the general policy. We do, and have, cancelled contracts, covering land that has been held

for speculative purposes, and has fallen into arrears. The general policy is, if a man is endeavouring to make a home, we haven't any particular limit as to how long we will carry him, but as a matter of fact, we have very many contracts on hand which have not paid anything for three years to twelve years.

MR. W. J. THOMPSON, of Saskatchewan: I have given some attention to my own particular district, one comprising some three hundred square miles, in which there is one family to five square miles. I can only say that in the five years in which I have been endeavouring to make a living from the land, I have tried to look into some of the features affecting us. I heard the statement made yesterday that the C. P. R. was a corporation with a conscience. Well, there are corporations, like people, with consciences, who do not practise it very much. I have been greatly interested, having had to give evidence before commissions, on several occasions, sitting in our province, in endeavouring to get data along these lines, with a special desire to get data on corporations with consciences. I have endeavoured to find out if the railroads were working with a broad policy to help the farmers in this country.

As some of you know, especially those from Saskatchewan, we have had great difficulty in the storing of our grain. We have a wonderful system now. We had a lot of kicking to do, and we did it. I happen to be an officer in a farmers' organization, which is a very militant one, and which will hit at railroads or anything else, when they get a chance. I wrote to the Department of Railways, asking for information, and I have gone out of my way to investigate these conditions. Here is one case in the last week, which is directly under my observation, and I cut this out as illustrating a principle. A Belgian, well to do, had just come out from Europe. He had contracted to buy a farm from the C. P. R. in the province of Saskatchewan. War broke out, he had left his money over in Europe, and the Germans had occupied his city, and it did not seem possible to get the money.

Now, where does the C. P. R. come in? There has been a change in the C. P. R. system, in the working of its conscience, in the past two years. All that I could wish, as a Canadian, is that the banks and other corporations in the Dominion, would start on the same policy as the C. P. R. did two years ago. Now, this man had not any money to pay on the land, as he had agreed. I went to the C. P. R. land office, and asked the manager there to show me his contract. I looked into it, and into the Hudson Bay contract, the same as I have examined others. I noticed one little place in the C. P. R. contract, which is different to any other contract which I had looked into, and it is all based on one word. The place I mean, is the forfeiture clause. I noticed that the

C. P. R. does not say it "shall" take the land away. It says it "may". I have not seen another contract of that kind.

This particular poor Belgian found himself stranded in that position in this country. They told that man to go ahead, and they got horses for him and a little machinery. They sent a man out there, who spent days with him, introduced him to the neighbours, and got him comfortably settled. Now, I am not saying this to help out the C. P. R. they can help themselves, but we have got to get down to the broad principles of this country. People will be dissatisfied. I was frozen out and hauled out and burned out, but here I am. I am as ready to hit as the next man; I suppose it is because I am Irish, but I wish to say that as a Canadian, we are proud of the fact that the C. P. R. has changed its policy in the last two years, I wish they had changed it sooner, and we are pleased to acknowledge that the C. P. R. has done what in this country no one has done, not even the Dominion Government, and that is to undertake such a broad policy as the C. P. R. has undertaken to promote homes on these western prairies of ours.

MR. TREGO: Can Mr. Dennis tell us what percentage of people were on the land two years ago, as compared with to-day?

MR. DENNIS: Are you referring to the Western Section of the Irrigation Block?

MR. TREGO: Yes.

MR. DENNIS: In the Western Section, we have sold about two hundred and ten thousand acres of irrigable land. Of that, never more than one hundred thousand were occupied, and the balance was speculatively purchased before we undertook our new policy. Of the one hundred thousand acres that were occupied and improved, there is probably not more than three-quarters of it, that may be an outside figure, that is in occupation to-day. In fact, perhaps it would be nearer to the mark to say it would not be more than fifty per cent. I have not the exact figures, but Mr. Stockton, who is near you, can probably give you the exact figures.

MR. JAMES JOHNSTON of British Columbia: I would like to say a few words on this subject. I have been an enthusiast in the fruit business for very many years, and I have been interested in the C. P. R. also, in many ways. I say without hesitation, gentlemen, that the exhibition here from British Columbia, depends, and has depended, on the Canadian Pacific Railway largely, and their keenness to help everyone who will help themselves. I don't know very much about this irrigation scheme of the C. P. R., but I do know that a great many people have come out here and have been put on a ready made farm, who thought all that they had to do was to sit

down and smoke their pipe and watch things grow. I have no doubt that the disappointments Mr. Dennis has had on his farms, are due to this kind of thing.

I have never yet gone to the C. P. R. with a fair proposition, in which I could show them that there was money to the railroad company, and also money to the farmers and fruit growers, that the C. P. R. did not at once acquiesce to the proposal that I made to them. I must say that in connection with the irrigation in this district, they will have the same results in the future, as they had in helping out the fruit growers of British Columbia. The success of our district has been due to the C. P. R. giving every possible assistance to everyone who helped themselves. (Applause).

PRESIDENT YOUNG: The Secretary has several announcements to make.

SECRETARY HOOKER: Cards can be obtained either here, at the desk, or at the headquarters, for the reports from the states and provinces, for the Chairman and Secretary of the Delegation, also for the members for the Committee on Credentials, the Committee on Permanent Organization, and the Committee on Resolutions, also for an Honorary Vice-President, and Executive Committeeman, for the ensuing year.

State delegations are called to meet at the state standards, immediately following the adjournment of this meeting.

The attention of the delegates is called to the programme for Friday, the trip to Bassano, and the inspection of the Horse-shoe Bend dam, which is free to delegates; also particularly, delegates desiring to go, must hand their names to and receive their tickets from Andrew Miller, Secretary of the Board of Control, or Norman Rankin, Chairman of the Publicity Committee, before noon on Thursday.

The attention of delegates is also called to the fact that those having railway certificates which require validation for the reduced fares or free trip home, should immediately hand them in, if they have not already done so, to the registration headquarters.

PRESIDENT YOUNG: The attention of the delegates is invited to our programme of this afternoon, each and every item of which will be carried out, as far as we understand. Mr. Loughheed, Senator and Member of the Dominion Government, will address the meeting, and Mr. Hinkle of Oregon, Secretary of the Oregon Irrigation Congress, will have something to say, and there is an address by Mr. C. C. Thom on the necessity of a higher duty of water.

If there is nothing further, we will now adjourn.

The meeting then adjourned till 2.30 P. M. October the 6th. 1914.

FIFTH SESSION

TUESDAY AFTERNOON, OCTOBER 6, 1914

2.30 o'clock p. m.

The meeting was called to order by President Young.

PRESIDENT YOUNG: The meeting will kindly be in order.

The Secretary has some announcements to make.

SECRETARY HOOKER: The attention of state and provincial organizations is drawn to the fact that delegation report cards can be obtained from registration headquarters. The only cards received so far are for British Columbia, Texas, Louisiana, and Kansas. As soon as the other organizations organize, their reports should be handed in at the desk.

TELEGRAM FROM W. A. FLEMING JONES

A telegram has been received from Mr. W. A. Fleming Jones, of New Mexico, who had made his plans to attend the Congress, but now telegraphs:—

Springfield, Missouri, October 5th, 1914.

Arthur Hooker, Secretary International Irrigation Congress,
Calgary, Alberta.

“Please express to the Congress my sincere regret that it is impossible, owing to important business in the Federal Court in Missouri, for me to be present. You have the good will of all New Mexicans. Don't overlook the importance of securing delegates from foreign countries.

(Signed) W. A. FLEMING JONES.

PRESIDENT YOUNG: We are in receipt of a telegram from the Honourable W.R. Ross, of British Columbia, expressing his regrets at his inability to attend the Congress at the last moment, and stating that the paper he had prepared to read to the meeting will be read by Mr. H. W. Grunsky. Mr. Grunsky is here and will read the paper which was to have been presented in person by Mr. Ross. (Applause).

Paper by
The Hon. W. R. Ross
Minister of Lands For British Columbia

BRITISH COLUMBIA IRRIGATION POLICIES

Paper read by H. W. Grunsky, of the British Columbia Water Rights Branch

Mr. Chairman, Ladies and Gentlemen:

I would like to say, by way of preface, that I know that the Minister of Lands was very anxious to attend this Congress and give his address in person, and it was a keen disappointment to him not to be able to be with you during the whole of this Convention. The Minister has devoted a great deal of his time and effort to the water question in British Columbia, which falls within his department, and that is the reason for his interest. This morning you heard from Mr. Peters what the Dominion Government has done by way of the administration of the waters of the provinces of Alberta, Saskatchewan, and the northwest Territories. Now the thought may have come to the minds of some of you that many of the good points in this Dominion Act were due to the fact that it was a large central government which was handling the matter, but I think it will be worthy of your attention, and will interest you to see from the other point of view, what the little province, not geographically, but in view of the amount of water rights that are administered, is doing.

I know it will interest the delegates from the other side of the line, because I have heard numbers of them express admiration for the efficiency of the British Columbia systems, and it is for that reason that I take especial pleasure in reading the paper of the Honourable Mr. Ross, the title of which is "British Columbia Irrigation Policies."

That this irrigation Congress should have decided to hold its twenty-first annual meeting on Canadian soil has given me a great deal of pleasure and satisfaction. Residents of the city of Calgary and of the province of Alberta have already extended to the delegates a welcome, the warmth of which cannot be mistaken. In this welcome all Canadians heartily join. We frankly confess that we have been partly selfish in our desire to have at least one meeting of this Congress held north of the international boundary line, and we hope that this will not be the last occasion of the kind. Now that our desire in this respect is being gratified, there already appear numerous reasons, from our point of view, for pronouncing the meeting a happy occasion.

Irrigation development in Canada, as you know, is still, relatively speaking, in its infancy. We are perfectly aware of the fact that many of the problems bearing on the subject which we are facing here now as new issues have come to be more or less old stories in the states to our south. Speaking for British Columbia, at any rate, I can say that we do not feel that we have finally solved one-half of the intricate questions relating to the waters and their administration.

Our experience in this direction has been just sufficient to supply us with an ardent and insatiable thirst for knowledge. This may explain to you the constantly increasing numbers of Canadian visitors at recent American irrigation conventions, both national and state. The formation of an inter-provincial association six or seven years ago by the sister provinces of Alberta and British Columbia is further evidence of the same frame of mind. The annual conferences of this association, which have been held alternately in the one province and the other, have become more and more successful with each succeeding year. The resolutions adopted have, for the most part, dealt with practical issues and have been the means of initiating much beneficial legislation. A special point has been made in having each year a strong representation of speakers from our neighbouring states. The meeting of this year was held at Penticton early last August and, although under rather trying circumstances, owing to the outbreak of the war just a few days previous to the opening of the Convention, the session was pronounced by many to have been the most helpful of any held thus far.

It is readily understood then, why Canada expects to reap especial benefits from the present sojourn of this great-broad-gauge and influential organization within her borders. Not only will many questions of a concrete nature affecting our immediate development be asked and answered; not only will fresh stimulus be given to the men here who are devoting their best energies to irrigation problems, but the interest of the public will be aroused and focused on the importance of these problems in a manner that would not otherwise be possible. If, on the other hand, the visiting delegates will be enabled, from a first-hand observation of our smaller and at any rate more recent development, to carry home with them some suggestion of value, Canadians will be pleased indeed.

Now, whatever may be said of the direct benefits accruing to delegates here assembled in the way of enlarging their views upon irrigation and kindred topics, I do not wish to pass this subject without referring to the indirect benefits that are sure to follow, from our point of view, the meeting of this Congress, made up so largely of American units, upon this side of the international boundary line. When the

citizens of two friendly states com-mingle for the purpose of solving common problems, it is a good augury for the future. Such friendly intercourse can not help but lead to a better understanding of each nation's ideals by the citizens of the other.

The administration of the waters in British Columbia is one of the important branches of work entrusted to the provincial Department of Lands, to the leadership of which it was my pleasure and privilege to be called about four years ago. I might explain that the "Crown lands," or, as they are called in the United States the "public lands," of some of our provinces, including British Columbia, are administered by the provincial governments, while in other provinces, particularly those more recently established, such lands are administered by the Dominion Government. The administration of the waters of the streams flowing through or over the Crown lands, or, what might be termed "Crown waters" is held to be a natural complement of the administration of the lands themselves.

On a small scale, British Columbia has had to deal with practically every phase of irrigation and water right problems. In saying "on a small scale" I do not mean to intimate that our water right problems have been less acute or that the feelings aroused over these problems have been less intense than in other jurisdictions. It is merely a confession that the magnitude of irrigation development in our province does not at the present time compare favourably with that in many of the states in the arid or semi-arid belt. This is due partly to the physical character of the country in British Columbia. A large percentage of the lands that are susceptible to agricultural development are more or less heavily timbered and the extension of irrigated areas is therefore a slow process. Our province is large in extent, and the valleys are separated from one another, and from neighbouring markets, by a wonderful net-work of mountain systems.

The first thought of the government has therefore been to afford transportation facilities to the many fertile valleys of the interior. The results of this policy are about to be realized, for with the completion of railroads now in the last stages of construction, there will, in the near future, be not less than four separate through lines intersecting the province from east to west; while north and south lines are under construction both on the mainland and on Vancouver Island.

The physical factors which have been enumerated as contributing to retard temporarily, agricultural development are not without their compensating features. While we are a little farther north, we have a distinct advantage over many of the states in point of altitude, most of our interior valley lands being between the 1,000 and the 3,000 foot mark.

Owing to the abundance of forest growth or natural grasses and the decayed mold which has accumulated in past ages the soil is usually found to be deep and rich in humus. The very mountain systems that make the transportation problem such a difficult one produce valuable water supplies and afford storage sites. While the clearing of our lands entails a larger expenditure in the first instance than in some other localities, the natural beauty of the country is such that it attracts a high class of settlers. The very slowness of our development too, has not been an unmixed evil, for we have been able to profit by the experience of neighbouring states, and put our systems into running order before our water resources have been too greatly squandered.

In British Columbia, as in other western states, the needs and exigencies of a mining community were responsible for the earliest statutory clauses relating to the use of water. It was not long, however, until irrigation came to be recognized as an absolute necessity and the statutes likewise provided for the diversion of water for this purpose. The miner's law, "first in time, first in right," settled the character of the early legislation. Every person who wished to acquire the exclusive right to divert any water from a stream for mining or agricultural purposes was from the earliest times required to have a record made in a government office. He also had to post notices giving certain particulars. It has never been finally decided in our courts to just what extent this legislation interfered with rights of such riparian owners as did not take out records. The matter is not of as great importance as might seem at first glance because in ninety-nine cases out of a hundred men took out records to protect themselves and the record-system has been generally accepted as definitely establishing the rights of record-holders.

There was one grave fault in our record-system, and I understand it was a common fault in every western jurisdiction; that is, that in practice, there was no limit placed on the quantity of water which could be recorded. One does not have to go back many years to find that residents of British Columbia believed that the mere recording of a notice to take water would give them a right in perpetuity for the quantity recorded, regardless whether or not they held sufficient land upon which to use the water and regardless whether or not they made any development under their records. The logical outcome of such a state of affairs can easily be imagined. At the rate at which records were being made prior to 1909, it is safe to say that the waters of every stream of importance in the Dry Belt of the province would by this time be held under records by private parties and claimed as vested rights regardless entirely of what, if any, development had been made.

As more people came to settle on the lands, these fortunate possessors of free water titles could have subdivided and sold off their water-holdings, enriching themselves out of an asset that really belonged to all the people. The vigorous protest against such a state of affairs culminated in the passage of the Water Act of 1909. The Act was designed to clear the slate of all titles except those which rested upon the actual use of water. Owners who claimed ancient rights, but who had not constructed works, were required to do so without undue loss of time. This Act virtually adopted the principles of similar legislation which had proved very successful in such states as Colorado and Wyoming in the settlement of water difficulties.

The underlying thought of this legislation was that speculation in water-titles must be prevented, and that to secure this desired result, holders of records must be given a reasonable time in which to make development, and if they failed to do this their rights would be forfeited. A Board, known as the Board of Investigation, was created under the Act, whose duty it was to determine and define precisely the extent of every existing right. The passage of this Act was a decided step in advance. The Act has been strengthened from year to year by the passage of amendments which gave broader powers to the officers who had to administer it and supplied the details for its proper administration. During the present year the Act and its amendments have been consolidated and revised and several chapters have been added incorporating new matter to which I will refer again later.

The government with which it has been my good fortune to be associated has appreciated fully the importance of irrigation and the part which it is likely to play in the future development of the province. It has therefore spared no pains in bringing both its legislation and administration respecting this important subject into a state of effectiveness. Only four years ago the entire staff of the Water Rights Branch consisted of a chief water commissioner, two Board members who gave only a small part of their time to their official duties, and three surveying parties engaged for the season. It was little realized how inadequate was this staff to cope with the investigation of some 8,000 old records, besides properly caring for new applications.

To-day there is a permanent staff of over fifty members, including the Comptroller of Water Rights, who is the chief administrative officer and ex officio a member of the Board; three other Board members, and eight district engineers, who reside in their respective water districts, and might be said to be the local arms of the service. Besides, this over twenty surveying parties are being employed from season to season,

gathering the data which is necessary before the Board can make accurate determinations of the rights held under the old records.

It is evident that there can be no satisfactory administration of water rights until those rights are clearly known and defined. There is an old saying that "good fences make good neighbours." So, among water users, a clear understanding of just where each man's right begins and ends makes for better relations. Following out this idea, the staff of the Water Branch has recently been concentrated upon the work of straightening out the old records. Over 3,500 claims have been investigated and over 2,000 determinations have been made by the Board up to date. The record for determinations during the past twelve months has been over one hundred per month, and this rate will probably be well exceeded during the coming year. Of the 2,000 determinations made, only five cases have been appealed, and in three of these the appellants are in default because of failure to observe the time limitations.

Records which are found to be in good standing are replaced by license, and those which are not are cancelled. Much care is exercised in the issuance of licenses so as to avoid a recurrence of misunderstandings. Not only are the terms and conditions pertaining to each right carefully set out, but every license is accompanied by an accurate sketch showing the point of diversion from the stream, the line of ditch, pipe or other conduit and the place of use. Different types of license forms are in use to suit different cases—about ten types in all.

As Mr. Young, our Comptroller of Water Rights, is to address you briefly upon the progress that is being made in the administration of the Water Act, I will not follow that phase of the subject further, but will simply point out one or two of the lines of policy that have been adopted by our Provincial Government. Most of these lines of policy have become effective during the past two years and are embodied in the "Water Act 1914" to which reference has already been made. This Act is unique in that it is a complete and comprehensive code dealing with the ownership and the use of water in a consecutive and orderly manner. One part of the Act, for instance, outlines rights and obligations common to all water users, while special divisions follow setting out the particular rights and obligations of particular classes of licensees, such as, those for irrigation, mining, waterworks, and power purposes. The chapter on procedure too, is very complete, outlining the steps which must be taken by applicants of various classes in obtaining their water licenses.

Thorough publicity is required of every proposed application in its initial stages, including not only the posting notices

on the ground, but advertisement in a local newspaper as well. The purpose of this is to bring to light at once any possible objections to the application, so that the Comptroller may act upon it intelligently.

The principle that beneficial use of water privileges must be made within a reasonable time by applicants is now not only thoroughly established, but it is being made effective in practice. This point has not been reached without some complaint from persons who were accustomed to loose administrative methods, and required a firm stand on the part of officers, but it is clearly in the public interest and will undoubtedly be maintained more strongly in the future.

The question as to how far a riparian owner may go in our province in the use of the waters of a stream without a record has been brought to an issue in a rather novel manner. I have already explained that the matter has never been threshed out finally in the courts owing to the fact, possibly, that there are very few claims to water rights which are based solely on the ownership of riparian land. However it is rather unsatisfactory for the department, whose duty it is to administer the waters, to be confronted by the possibility that rights uncertain in nature and extent may exist. Therefore a time limit has been fixed under our Act, within which all persons claiming any rights to the use of the waters of streams, solely by virtue of being riparian owners, must file their claims before the Board, and these claims will be dealt with exactly as are claims under record. When the time limit expires no further claims of riparian owners as such will be recognized.

In order to guard carefully against the granting away of the more important and valuable water privileges without due care and inquiry, particularly those privileges which involve the sale, barter and exchange of water or of water power, a special procedure has come to be established in our province. Applicants for this class of privileges must not only obtain a water license from the comptroller, but must have their undertakings approved by the minister; in fact this approval is one of the very first steps required of such applicants. In order to relieve the minister of much detail work in this connection, the petition for the approval of the undertaking is, in the first instance referred to the Board of Investigation, which makes its report to the minister. The Board goes carefully into such questions as whether the financial position of the applicant gives promise of his carrying out the undertaking successfully and as to whether the general scheme proposed is in the public interest. Applicants are not authorized to undertake surveys and the preparation of detail plans until they have obtained this approval of the undertaking as a preliminary step. In this way the plea that

a particular applicant is entitled to consideration on the ground of having expended large sums of money is avoided.

Several other measures have been made effective recently with the aim of conserving the valuable water resources of the province. Licenses issued to companies for waterworks and power purposes are now being limited to a term of years, the maximum life of any such license being fifty years. In other words, such privileges are leased rather than given in perpetuity. A bond is required of applicants for these privileges to insure construction of works without undue delay. A rental fee is also charged during the survey-con-



W. E. SMITH'S EXHIBIT.

struction period, which is sufficiently onerous to discourage the mere holding of sites for speculative purposes. In order not to work an injustice on applicants who proceed with the construction of their works in good faith, all amounts paid for rental during the survey-constructive period are, however, credited on account of rentals during operation period. This idea had been taken from the regulations of the United States Department of the Interior, and has the wholesome effect of making the applicant toe the mark in the survey-construction period, but lightening his burden in the early years of the operation period.

While such steps as those outlined are taken for the purpose of retaining important sites in the possession of the province until applicants come forward who intend actual development, every available means is taken in the meantime for the collection of accurate data respecting the undeveloped sites and giving the same publicity. In this connection a particular point has been made of stream measurement work. To facilitate more active and systematic progress in this important line, a co-operative working arrangement has been consummated recently between the Dominion and Provincial Governments under which the former has undertaken the collection of such data, the province contributing toward the cost in exchange for the right to use and publish the data to whatever extent might be desirable. Work has been carried forward under this arrangement for about a year under the direction of J. B. Challies, Superintendent of Water Powers and Hydrographic Surveys, and has resulted in much more extensive and continuous stream gaugings than would have been possible otherwise. It is hardly necessary for me to impress upon this audience the importance of this work in respect of possible future development of stream waters.

Perhaps the most important step taken by the province in recent years, from the point of view of the irrigation farmer, is the legislation on public irrigation corporations, or "irrigation districts" as they are called in the United States. Here again the cue was taken from the experience of the Western States. Experts were engaged to make a careful study of the legislation of these states and that of the Australian provinces; also to enquire into the special conditions existing in British Columbia, and to frame a bill with a view to meeting these conditions. This was done and the bill has now been incorporated into our Water Act.

To those who are not acquainted with British Columbia, I might explain that a large part of our best agricultural lands, especially east of the Cascade Mountains, is of an arid nature, requiring the artificial application of water for the successful growing of crops. The demand for agricultural products greatly exceeds the local production; therefore, it is highly desirable to secure the extension of the irrigated areas wherever possible. At the same time the most available sources of water supply for individual ditches have long since been occupied. The more recent settlers, in seeking to establish their water supply systems, have been confronted by a difficult task, the accomplishment of which has often been far beyond their financial means. The result has, in some cases, been a half-hearted attempt in the building of irrigation structures, slow progress in the clearing and levelling of lands and a general unsatisfactory condition.

While the Provincial Government has been importuned from some quarters to alleviate these conditions by having the province itself build the irrigation structures and deliver the water to the farmer's door, it has hesitated to take this step. The outlay which would be involved in satisfying the wants of the many different sections of the province would be very large moreover, once the government undertook a work of this kind, requests for aid in other undertakings, such as clearing of lands, would be sure to be urged with even stronger reasons, and it would be very difficult for the government to draw the line and call a halt. Therefore, it has hesitated to take a step which might have such far reaching results.

In searching about for a means of helping the farmers to help themselves, attention was directed to the many forms of co-operation in vogue in the western states and especially to the irrigation districts, and it was decided to give every possible encouragement to the formation of similar institutions in British Columbia. The Act, therefore, has been enlarged so as to provide for various types of water users' associations and mutual water companies. The principal of these, and the one best adapted to co-operation between water users on a large scale, is the public irrigation corporation.

The main purpose of this form of organization is to place in the hands of those who own land and use water the management and control of their irrigation systems, and to provide a method for securing funds to construct and operate works that are too costly for the individual or small groups of individuals to undertake. By means of such corporations money may be borrowed upon debentures, and taxes may be imposed which become a lien upon the lands benefited.

The plan adopted is the essence of government supervision, as distinguished from government ownership or management. The initiative in regard to every important act is on the land owners themselves, or upon trustees who are elected by them, and thus they become responsible. While this is true, the government does not propose to permit the land owners to make any mistakes in organizing or financing their enterprises, and therefore numerous safeguards are adopted. Every important step in the life of the corporation must be approved by officers of the government. Such matters as the securing of an adequate water supply, the establishment of boundaries, the adoption of plans, the letting of contracts, and the borrowing of moneys are all subject to the approval of a Board before becoming final. The idea of this supervision is to protect the farmers against the very mistakes which farmers are likely to make if left to their own resources.

There is another respect in which our Act is somewhat original and that is that the province undertakes certain

initial surveys and investigations. One of the most fruitful sources of trouble encountered in the past, not only by irrigation districts, but by all kinds of irrigation enterprises is that careful preliminary investigations were not made concerning such matters as the available stream flow, the possible storage facilities, the canal route, the character, location, and area of lands to be irrigated, and the probable per acre cost of the irrigation project. In order to doubly guard against mistakes in this direction, and to prevent land owners voting for a scheme on insufficient information, it has been arranged that the initial surveys and investigations for determining the feasibility, practicability and probable cost of the proposed undertaking shall be carried on under the direction of the government. If the corporation is afterwards organized, the moneys laid out for such surveys and investigations are paid by it into the provincial treasury.

The public irrigation corporation is given power to take over privately owned systems, within the corporate limits, on an equitable basis by means of arbitration. For this purpose the procedure already provided in Part XV. of the Municipal Act is adopted.

It is readily seen that this legislation will not make conditions unnecessarily onerous for capital in entering this field. On the contrary, it is well understood that capital must be encouraged and that it must be sure of an adequate protection and remuneration. At the same time the interests of private land owners and individuals must not be lost sight of.

The rigid inspection and requisite approval of all important acts of the corporation by an impartial commission should at once give capital the assurance that it is looking for and protect the individual land owners. It is hoped that in this way confidence in irrigation bonds as a safe investment will be restored. Wasteful extravagance on the part of the public irrigation corporations will be prevented as far as possible. The repayment of sinking funds yearly will keep always before the farmers and users of water the necessity of meeting their obligations, and the long term period should not make this task too onerous.

Although the taxes levied by the proposed corporation becomes a lien upon the lands affected, the security of mortgage holders is raised and not lowered by the transaction. Herein lies an important distinction between the security to be offered by the public irrigation corporation and that offered by municipalities to debenture holders. The money borrowed is to be expended for a purpose which will greatly enhance the value of the land within the corporate limits. It is well known how, in any arid region, land which before the advent of an irrigation system has a very low sale price,

will, when the application of irrigation water is made possible, advance in value. This clearly demonstrates that water and not land is the valuable asset, and that any plan of perfecting the water supply is certain to enhance the value of the land.

Another feature is that this form of organization will make possible the co-ordination of existing systems of any locality into one unified project. Even the layman can see that where the irrigation ditches of various individuals parallel or cross one another at random there is a decided loss in efficiency and a correspondingly increased cost in the distribution and delivery of water. The correction of these evils should bring about a lower average cost of maintenance and operation of canal systems, economy in the use of water; a wider field for its distribution; better revenues therefrom. This again will mean increased security for debentures and bonds already existing or about to be created on irrigation works.

Two petitions for the formation of irrigation districts have already been filed and are at the present time being carefully investigated. The legislation respecting the organization of smaller associations and mutual water companies has also been well received. This, coupled with the fact that the licenses defining water rights are now being placed on a firm basis, and barring, of course, unforeseen contingencies, causes us to look forward with great hope to a more satisfactory irrigation development in the near future. (Applause).

MR. DENNIS: Mr. President, Ladies and Gentlemen: I am asked by the Deputy Minister of Agriculture, for the province of British Columbia, to request that those present would sample the apple production of British Columbia, of which they have placed a couple of boxes in the front. (Applause)

PRESIDENT YOUNG: It will now be our pleasure to hear from the Honourable James A. Lougheed, Senator of the Dominion Parliament for the province of Alberta, and also a member of the Dominion Government. (Applause)

Address by

Hon. J. A. Lougheed

Senator for Alberta; Member Dominion Government

Mr. President. Ladies and Gentlemen:

In looking over the programme for to-day I find that my name is down for an address. Now I wish to disclaim at this point any idea of entering upon anything so formidable as an address. I am here in a kind of semi-official capacity,

to take the delegates by the hand and tell them how glad we are to see them. The fact is, I have been asked by the Prime Minister, on behalf of the Dominion Government, to extend to this International Irrigation Congress, our warmest welcome and most cordial greetings. We especially welcome those gentlemen who come from the United States, to represent in this Congress the interests of the great Republic to which they belong. We value your presence here, in connection with the particular mission which you represent, but I am not disparaging that statement of value, when I say that we value it even more highly on account of the representative capacity in which you come to us, representing international relations of good feeling between these two branches of the great Anglo-Saxon race. (Applause)

Few things contribute to the broadening of international relations, so much as a generous exchange of ideas and a free expression of thought, of mind and of feeling, amongst the representatives of different nations, particularly those great nations who are engaged to-day in the building up of our common civilization. The greatest task, Mr. President, that we have before us to-day, that is, those of us who pride ourselves upon being progressive thinkers, is the difficulty of bringing together different nationalities so that they may better understand one another, and come in touch with that common brotherhood which makes us all akin. It is the absence of this, I may say quite safely, which results in the misunderstandings and the jealousies, which ultimately resolve themselves into international complications, conflicts, and bloody strife, and which we find to-day, engulfing the whole of Europe. It is therefore, with the greatest pleasure that the government of the Dominion of Canada, observes from time to time the interchange of these courtesies and that community of interest which marks our two peoples on both sides of our boundary line. This is particularly evidenced in gatherings like the present, where we meet together for the promotion of the arts of peace, for the advancement of a common civilization, and particularly, as upon the present occasion, for discussion concerning the development of those great natural resources which a bountiful Providence has so beneficently distributed on both sides of that boundary line which separates you, our good neighbour on the South, from those of us who live to the North of you. I regard this gathering as an evidence of the assurance of the progress which is being made in the improvement of the great natural resources of our continent.

In the make-up of our civilization, there are two things particularly which impress themselves on our minds, and particularly in discussions which take place on an occasion like the present, and with which this Congress has particularly

to do, one of which is a proper appreciation of the fact that Nature has granted to the people of this North American continent, the greatest heritage of all ages, the natural resources which we possess, and that the Creator has imprinted upon that trust which he has confided to us, the duty of developing those resources. The other is the complement of the first, that there is a duty placed upon every man to render a measure of public service to the community to which he belongs, by extracting from these natural resources the greatest sum of human effort and happiness which they are capable of producing. This Congress is an acknowledgment of that duty which lies upon us, of assuming that responsibility of developing these resources. And it is in the development of that particular question upon which the future greatness of this continent must necessarily rely, a greatness which I feel confident in saying that if every man does his duty, in this particular respect, the greatness of this continent will transcend in its beneficence the greatness of all the other continents of the Universe.

Now, it has been well said, Ladies and Gentlemen, that he is a public benefactor, who makes two blades of grass grow where one grew before. This especially applies to the irrigationist. Your duty particularly is to make the wilderness and the solitary place glad, and the desert to bloom and blossom as the rose. The Creator, in apportioning to you and to ourselves, our heritage, included on both sides of the line, very large areas of semi-arid lands. You, years before us, recognized the necessity of bringing into cultivation that particular share of your heritage. What you have done in the Western States and in the Pacific States, we are attempting to do to-day in the large areas of the prairie province to which we belong. Although the science and the principles of irrigation are as old as the human race, yet we have such pre-conceived ideas upon methods of agriculture, that we find more or less resistance on the part of the public, particularly in our own country, to a proper application of water upon the land. We find many of the old style of agriculturists who regard it as almost sacrilege. They look upon this disturbance of Nature, Nature having separated the water from the land, as an invasion of those methods which the Creator Himself first employed, when man sought to cultivate the earth.

The greatest difficulty we have to contend with in making progress in the matter of irrigation in this western country, is to secure the sympathy and the support and co-operation of the agriculturist in this particular regard. The old style of agriculturists views the matter in very much the same way as the Israelite did the placing of sacriligious hands on the Ark of the Covenant. We have to overcome this. Although

we boast of the progress that has been made in agriculture in years past, I say advisedly, and not as a pessimist, that our systems of agriculture are not comparable in the progress that they make with the other branches of industrial life. True, agriculture has been progressive in spots, where scientific methods have been employed, but when we speak generally and place the system of agriculture as an industrial branch of human affairs, alongside of the other great branches of our industrial make-up, agriculture is comparatively stagnant. This, I might say, is particularly evidenced in the absence of increased tillage of the land, and the absence of increased products of the land, in the abandonment of the farm, and the difficulty of inducing the farmer to remain on the land. The greatest question we are discussing to-day in our State, Provincial and National Governments, is, how can we bring the people to the land, and how can we keep the people there? The very acknowledgment of the fact that we have to discuss this question in all of the serious phases which present themselves to our mind, is admission of the fact that we have failed in solving this, the greatest problem that is before civilization to-day.

I am only stating fundamental principles when I say to you that agriculture is the basic interest of every national interest, that in proportion to the development of our agricultural interests, so must be the progress of the other great interests which our civilization represents. I take no pessimistic view of the situation when I say that if agriculture during the next generation, should decline relatively to the same extent as it has done in the past, when placed alongside of other occupations, it will almost have disappeared. The equilibrium between the country and the city has long since passed. The sceptre between the rural and urban population has departed, and is to-day wielded in the city. The restoration of that sceptre, so that the equilibrium may be maintained between those two interests, is one of the greatest questions that we have to deal with to-day.

It has been said that while man has made the city, the Lord has made the country. That is placing the Almighty, I say this with all reverence, in a very false position. The building up of a modern city is the culmination of the highest ingenuity. It means the highest class of organization, human effort, knowledge, and ceaseless endeavour, and it stands to-day as one of the greatest tributes to the human mind. But we have not applied the same principles to the building up of the country. We have accepted it the same as it was turned over to us by nature and we have been satisfied to let it so remain. I say unhesitatingly that until you gentlemen recognize, and State and National Governments recognize, that the same methods must be employed

in the building up of the country, as are employed in the building up of our great cities, so long will we lag behind the cities, and so long will we discuss the city in relation to the farm.

I came here chiefly to express to you the satisfaction of the Dominion Government in this Congress having paid to Canada the tribute which it has done in meeting here. I may say at the same time, as a citizen of Calgary, that we appreciate very much the honour you have done to us in meeting in this city, this city of great expectations, if I may say so, and this city which we owe largely to the presence in our midst, of a great many from the Republic to the South of us. (Applause). Now that you are here, gentlemen, delegates from the other side of the line, if it were possible, I should be very glad to see you interned within the boundaries of our city, and I would regard that as a surety of the progress which we anticipate.

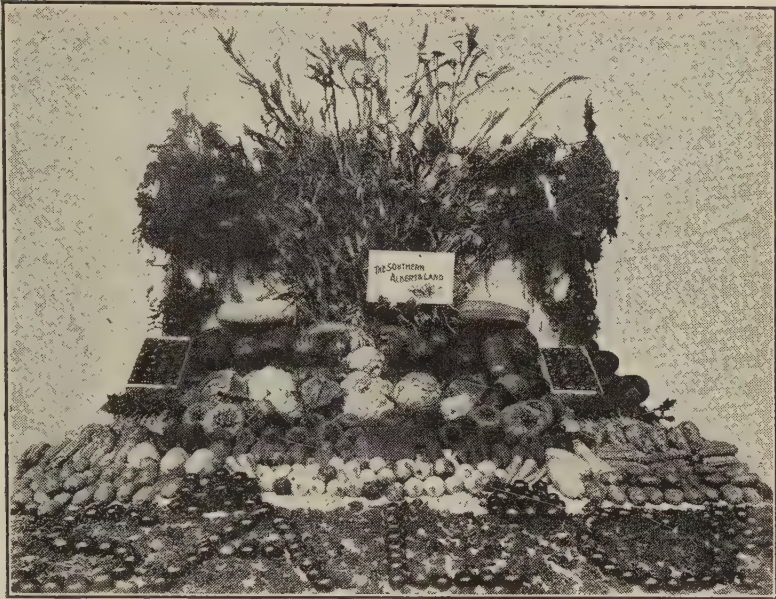
We trust that your deliberations will be productive of every success, and that your further stay with us will be pleasurable and profitable beyond your most sanguine expectations. (Applause).

PRESIDENT YOUNG: I am sure that I express the views of every member of this Congress, particularly its alien members, when I express to Senator Lougheed our deep appreciation of the Honourable Premier Borden's welcome to Canada, extended through Senator Lougheed, and our pleasure in listening to the sentiments of good will and fraternity that have actuated Mr. Borden's welcome.

Our next number upon the programme will be a discussion of "The Irrigation District," by Mr. J. T. Hinkle, of Oregon. Before however, Mr. Hinkle rises, Mr. Dennis desires to make an announcement.

MR. DENNIS: With reference to the excursion on Friday morning: we are desirous of avoiding as far as possible confusion at the last moment, and we have therefore put in the hands of the clerical staff at the registration office tickets, which will be handed over to every delegate on the presentation of his badge. The excursion is one tendered by the Canadian Pacific Railway to the Congress to Bassano—a point about one hundred miles east of here, where we have some large irrigation works. The train will leave Calgary at 10 o'clock, arriving at Bassano at 12.30 o'clock. The people of that little town are tendering a luncheon to those who will honour us with their presence, after which a short drive will be made, of three or four miles, to visit a large dam and some other structures there, arriving back in Calgary

at 7 o'clock. We do not wish to leave everything to the last moment, and we shall be very much obliged if the delegates will call at the registration office within the next couple of days, and get their tickets.



THE SOUTHERN ALBERTA LAND CO'S EXHIBIT.

PRESIDENT YOUNG: Mr. Hinkle will now address us. (Applause).

Address by

J. T. Hinkle

Ex-Secretary Oregon Irrigation Congress, and Chairman of its Legislative Committee

THE IRRIGATION DISTRICT

Mr. President, Ladies and Gentlemen:

My effort to-day will be to give you some idea of the practical operation of the Irrigation District in the arid and semi-arid states of the United States. I have been very much interested in the address by the Honourable Mr. Ross, of British Columbia. I was aware that the Province of British Columbia had made some study of the irrigation

laws prevailing in the United States, and I had some knowledge of it, but I am surprised and gratified to note that the province of British Columbia has taken the meat from the cocoanut, as it were, and has studied our irrigation laws and worked out a vast improvement, in my judgment, upon the original plan.

Now, briefly, the irrigation laws provide for an organization of any body of land-owners owning, or contemplating the purchase or acquirement of a common source of water supply, by petition to the county court of the county in which the district is situated. The county court makes an order describing the boundaries, as set forth in the petition, and calling an election within those boundaries to determine the question of whether or not the District shall be organized. The people of that territory get together and vote on the question and also, if the vote is favourable, they elect the officers—a board of directors—and such other officers as may be required in that District. This vote is canvassed by the Board of County Commissioners, the bonds of the officers approved by the county court and the new municipality is launched upon its own responsibility, with full power to acquire water rights, rights of way, reservoir sites and, in fact, to do all and everything that comes within the purpose of the organization of the municipality.

Now they employ their engineers to go out and make the necessary surveys to determine the value or cost of building the irrigation works. After their plans and specifications are completed by such engineers as they may employ, they call an election in the District to vote the bonds of the District to build the irrigation works. If the vote is favourable, the plans and specifications are submitted to the state engineer for his approval, or for the purpose of pointing out any errors or omissions that may have been made in the plans and specifications. As an additional safeguard, the law provides for validating the proceedings, in the organization and the bonding of the district and so on, and a petition is presented to the circuit court of the state, and after notice of the hearing of the petition, the proceedings up to and including the issue of the bonds are validated by the decree of the court. From this decision an appeal lies to the supreme court, as a matter of course.

Now after the decree of the court is handed down, validating the proceedings, the lien on the lands of the District for the benefit of the bonds is absolutely fixed. It ends the litigation there and then as far as the lien on the land is concerned, and in so far as it is within the power of anyone to open up the proceedings for errors in the records. Now that is the plan. Its main features are these: First, it provides a simple, plain and adequate form of government for

the people within a given district engaged in a common venture. Second, it fixes the validating of the proceedings and of the issue of the bonds, beyond the peradventure of questions in the courts, and thirdly, it places in the hands of the people who are to pay the bills absolute control and government of their own municipal affairs.

It may be interesting to you to know that in the early history of our Federal Reclamation Act, whether this plan was considered or not for the purpose of local government under that Act, it was not adopted. Instead thereof, was adopted a water users' association, based upon the old theory of the stockholders corporation. In its operation it has not been popular or effective and it has not fulfilled the purpose for which it was intended. The government itself, in most instances has had to take the whole matter in charge and look after the collection of assessments and installments of payments on water rights. In the conference held last April in Denver with the Minister of the Interior, consisting of delegates from practically all of the arid and semi-arid states, the Convention went strongly on record as favouring the State Irrigation Law, as the basis not only for future work by the government itself, but for co-operation between the government and the individual state, and for all practical purposes.

I have just returned from a commission appointed by the Governors of these states, consisting of two men from each state. The commission was held at Helena, on the first and second of this month, and there again this commission goes on record tentatively as favouring the Irrigation District, and emphasizing the Irrigation District as being the best basis for present and future operations, and this sentiment is growing now in the operation of our great Reclamation Act projects throughout the states, that the Water Users' Associations under government projects ought to organize themselves into irrigation districts and take over the management and control of the works which supply water to their land, and the government and control of their own local and internal affairs. As I said before, British Columbia has taken up this idea and incorporated it into its own water code.

Now it does not make any difference how your irrigation project is built, whether it is built by your Federal Government, by your State Government, or by private enterprise, the fact remains that before it can eventually succeed, it must be settled up by a thrifty class of people, actually residing on the lands benefited, and those people obligated to pay the bills, to pay all the charges, not only of construction, but of maintenance and operation; and so, the pioneer—no matter what your theory, no matter what your high conception of the great duties of government or of state

may be, you must come down to the ground, and you must get down to the individual unit, where you find the farmer upon the land; and you must fix up a scheme, not to fit your own pre-conceived notions of the propriety of things, but you must fit your scheme to meet the wishes and desires of those very people who are fulfilling the purpose for which the great work was inaugurated in the beginning to fulfil.

You cannot get away from that proposition any more than you can have taxation without representation. You cannot establish fraternal bureaus and protectorates for the free born American citizen, who chooses to take the shaping of his own destiny into his own hands, and who loves and idealizes, if you please, the old "sink or swim, root hog or die" principle, handed down to him by his sturdy American forefathers. So, if you are eventually going to make him pay the bill, then, give him the government and control of his own local affairs, and if he succeeds, all good and well, and if he fails, it will be no more than thousands of other good citizens of this country have done, and all the states have failed, time and time again, and yet have come up and succeeded, time and time again, and eventually won out in the enterprise.

Now, what we want in the state of Oregon is our full share down there from the Reclamation Fund. We have contributed about fourteen million dollars to the Reclamation Fund, and we have gotten back about four million dollars, I believe. We are about ten million dollars short. We are not kicking on that, because we believe that our own members in Congress were asleep at the switch when the train went by, but nevertheless, the State of Arizona, which contributed about one million dollars to the fund, got back something like seventeen million dollars, and we saw some very pretty pictures of Arizona on the canvas last night, but for some reason, perhaps best known to Mr. Newell himself, our little dinky state out there of Oregon, was not shown on the pictures. We don't care about that.

The State of Oregon has gone further than any other state in the Union, and it has done more than any state in the Union ever did, and probably will do. It has contributed \$450,000 of public money, through the legislature, for the purpose of restoring one of those lame Carey Act projects which we heard mentioned here yesterday. We are proud of that enterprise. The state built it and built it quickly and successfully, and we may build some more. We don't know whether we will build them by direct appropriation, or on the Irrigation District plan, but we are organizing Irrigation Districts in our state, and we are making extensive investigations.

The last Legislature placed a limit of \$1 an acre on the cost of investigating the probabilities of any project in any district. We have recently made investigations, costing thirty or forty thousand dollars, merely in the shape of getting plans and specifications. We have recently bonded a little Irrigation District, and we have others under contract for bonding. Now, what we want is for the district laws of the United States to be made uniform. We want some provision of law whereby the government, through its Reclamation Service, and that is a very efficient service, may come, upon the petition of any settlers in any given district, and examine its proposition and report upon it. We have a half-hearted method of reports by the state, through the state engineer, but it is not strong enough.

In addition to that, we want the United States to come and examine our project, and put itself on record by saying whether the project is good or bad. Now, if the Federal Government has not the money to build it, perhaps we can build it, on the strength of our government approval and our state approval. We want that for two purposes. We want it for the purpose of right and justice, and as security to our own people on the land, and who are about to enter upon these lands, and we want it as a safeguard to eastern investors who may take our bonds. We hear it said that the Reclamation Fund has all been appropriated, and that we cannot get much more money from the Federal Government, but we ought to be able to get at least an appropriation sufficient to enable our government to examine some of the great and good things of the West and say to the people at large whether or not this proposition will stand investigation. That is where our trouble has all come in, in the bonding of Irrigation Districts.

In these bureaus and Reclamation Service outfits, men become partizan from the head man to the ditch walker, and whatever the head man says, it goes right down the line. I was talking to a head man the other day and I was very glad to hear him say that the Irrigation District was a good thing, and I met recently a man from the Reclamation Service who was very pleased to talk Irrigation Districts. As a matter of fact, there is only one way for the building up of the Irrigation District, and that radiates clear down to the remotest outskirts of the proposition. Go and ask many of these state engineers, and many of these men in the employ of the Federal Government, and they will proceed to tell you at once that a project is no good, whether they have ever examined that project or not.

Our own state engineer approves a project, and the plans and specifications of an Irrigation District, and then concludes his approval by saying that he doesn't know anything about

what he is saying, and that he has never been on the project, never saw it and doesn't know anything about it. Is there any wonder that we have difficulties in bonding legitimate propositions? Now, if these services will co-operate with the states, and go and look at propositions, and say whether or not they are sound propositions, our problem is solved, but as long as we have such great diversity of opinion as to the methods to be pursued in the development of the arid lands of the West, we will have the same old trouble.

Now, Mr. President, and Ladies and Gentlemen, I have briefly outlined the plan of the Irrigation District and its operation in the states. I have attempted no technical discussion of the subject, and I have prepared no technical paper upon the subject. If there is any discussion or any question anyone wishes to ask me concerning this subject, I shall be glad to answer it, otherwise, Mr. President and Gentlemen, I thank you. (Applause)

CHAIRMAN DENNIS: The subject which has been discussed by Mr. Hinkle is one of particular importance. I will therefore ask the meeting for suggestions, if it is desired to have any discussion.

MR. F. H. NEWELL, of Washington, D. C.: Mr. Chairman, the Irrigation District, so well presented to-day, seems to offer a way out of some of the difficulties which have been encountered in the past. As yet, few of the states have effective irrigation district acts. The Reclamation Service has entered into negotiations with one or two Districts of this kind, and is able to do business with the District under arrangements which are more or less temporary in character. That is to say that the law does not directly recognize the contracts which are being entered into between the Reclamation Service and the District, but we have hopes that the laws will be perfected and may reach that degree of perfection which I understand exists in British Columbia.

Now, pending the enactment of suitable District laws, we have attempted the formation of the Water Users' Association, which, as Mr. Hinkle has stated, has not been wholly satisfactory. The necessity of it arises in this: when the government starts to reclaim public land, there is usually a considerable body of private lands in the vicinity, or included along with the other lands, and to enter into a contract with these owners for their reclamation, and to put what is virtually a market value on them for their reclamation, an association has been formed. Now, this is not an association which is contemplated by the Reclamation Act, and which ultimately owns and operates the works. It is a temporary expedient, and it has some of the virtues and a great many

of the defects which arise from temporary works every time.

A corporation issues stock, and can levy assessments on its members, but it cannot force into its partnership the minority or the ownership of public lands, and the only way to coerce, is for the Secretary of the Interior to issue orders that water shall not be supplied to the men who are back in their dues to the association. Now, naturally the minority resent this very much, and being forced to pay dues to an association of which they do not always appreciate the necessity, there is always that difficulty. The District, however, where it is formed under effective state laws, can bring in all of the lands necessary and can force the minority, generally the few large land owners, to do those things which are essential for the success of the District.

Now, what we want, are two things: first, a Federal law which will recognize these Irrigation Districts, and permit the government to enter into contract with them; and, second, a perfection of state laws, such as in the case of British Columbia mentioned, and some of the states, where it is possible for a district to be formed, and enter into a contract with the Federal Government. At the present time, their method of procedure is so limited. They must issue bonds in a certain way, and these bonds cannot be taken by the Federal Government as security, so we have in the majority of cases, the deadlock because of the imperfection of the laws permitting the execution of the necessary agreements and reaching the necessary understanding.

As stated by Mr. Hinkle, I believe the way out of some of the present difficulties may be solved by the Irrigation District possessing the power of taxation, and one it can exercise on all of the lands, and all of the property included within the district and including in that also the city or suburban property which is benefited by the existence of the Irrigation District, although it may not actually receive water for its lands. (Applause).

CHAIRMAN DENNIS: Before proceeding with the next item on the programme, I am asked by Major Young, President of the Congress, to announce that he has appointed as temporary Chairman of the Resolutions Committee, Mr. J. T. Hinkle, of Oregon, and as temporary Chairman of the Permanent Organization Committee, Mr. L. Newman, of Montana.

I also desire to announce that the Honourable, the Minister of Agriculture for the province of Alberta, after his address last night, placed in the hands of the Executive, a large number of copies of the reports of the Demonstration Farm and schools of agriculture within the province. There are a supply of these in the Administrative Headquarters, and I

shall be very pleased if any delegate will care to take one with him.

The President also desires to announce that the Permanent Organization Committee will meet at 1.30 o'clock to-morrow, Wednesday, in the Sun Parlour of the Palliser Hotel, under the chairmanship of Mr. Newman.

The next item on the programme is an address by Mr. C. C. Thom, Soil and Irrigation Specialist of the State College of Washington, on "The Necessity of a Higher Duty of Water." (Applause).

Address by

C. C. Thom

Soil and Irrigation Specialist, The State College of Washington

THE NECESSITY OF A HIGHER DUTY OF WATER

Mr. Chairman, Ladies and Gentlemen:

I have been listening with much interest to the discussion of matters pertaining to irrigation, and with regard to the management of the irrigation project, and with regard to engineering features of irrigation, but to me, in the capacity I at present hold in the state of Washington, there seems to be no more mooted question than the "Duty of Water." The Duty of Water is understood to mean the amount of water that is necessary which, being applied to the soil during the growing season, will give ample or profitable returns in agricultural produce. The first difficulty arises in understanding the term. You will see, in reading the reports of certain projects, that the Duty of Water is a second-foot. In another project it is an acre-foot, or it may be acre-inches. Again it is expressed in miner's inches.

Now the second-foot would be a good term to use if, coupled with that, there was always a certain area in mind, but we know that that varies anywhere from 16 to 160 acres on many of the projects. Again we have the acre-foot. To my mind that is a most expressive term, because it expresses area with volume. That is a very good term. The acre-inch is also all right, because it is a fraction of an acre-foot, but when it comes to the miner's foot, or miner's inch, that, it seems to me, is entirely out of place in irrigation practice because it is a varying standard in different states and provinces, and, unless we are familiar with that figure in every state, it will be impossible to determine what is meant by the term "miner's inch". I think there should be an effort made to unify that term. I remember being on one project this summer, and I mentioned "acre-foot," and the farmer did not know what I was talking about, but he

did understand miner's inches. That seems to me to be ridiculous. Let us express it as we would rain-fall. That is not the great difficulty however.

In looking over the projects in the United States and the Dominion of Canada we note that the Duty of Water varies very considerably from one place to another. I happen to know two projects, situated side by side, under exactly similar conditions as to soil and climate, the one of which has a Duty of Water of twelve inches and the other has a Duty of Water of three acre-feet. Now there is something wrong. There is a difference there under exactly similar conditions, because I have been over both, and discovered no material difference and there is that difference of two acre-feet. It seems the idea should be that the climatic conditions should determine in some degree the Duty of Water in that district. However, that does not seem to have entered into the consideration of project owners in the early days in determining as to how much water was actually necessary for any project. Rather it was a question of how much water could be had over a certain area of land which was available, or if it was a pumping proposition, it was a matter of expense, and they will keep it down for that reason.

That is entirely aside from what the problem ought to be. It should be what water is required to produce this or that crop under a good set of conditions. That does not enter into the consideration of all projects. There is no stipulation under agreement or contract or anything else that you should use so much water for one kind of crop and so much for another, but you have so much, and you should use it regardless of whether that usage is good or not. Now, noting this, it seems to me reasonable to believe that different crops needed different amounts of water. We therefore undertook to see whether there was any difference, by means of experiment.

Before going into that, let us go back and see what is the function. Why do we apply it to these arid lands throughout the West? We know that the ultimate result is the production of crops, but why do we have to have water? It is simply because the plants take their food in solution. Water is a carrier, it carries the plant's food from a certain point and places it into the plant. That is a well known thing and it would seem reasonable to believe that the larger load you carried with a reasonable amount of water the less water you would likely need. In other words, if you had a good strong solution you would use less water than if you had a weak one. I remember talking before a high school class in our state one time, and I was explaining how it was that plants fed, and one girl in that audience got the idea that plant food was soup, and then she got an idea

that it might be a thin soup, and that has been the case in many instances. We have been pouring on so much water that the soup which those plants fed on has got mighty thin. We have been doing that without any basis whatever. Who has ever told you whether it took more water to grow potatoes than it did alfalfa or the other way about? Our first experiments were outlined to show whether or not that contention might or might not be correct. We determined this in large tanks, four feet in diameter and six feet in depth, which were weighed from time to time, so that we knew how much water was being taken from them, and here are the results. The first crop that we had was potatoes. We determined this to see how much water it took to produce a pound of each plant in a perfectly dry state. It took 167 pounds of water to produce one pound of potato. The next is with onion, and the next with corn, 249 pounds of water. Now I will let you read this table over. Here are oats, beans, cabbages, peas, wheat, alfalfa, 446 pounds of water to make one pound of alfalfa, corn 240 pounds, barley 320 pounds. Now would it seem reasonable to the man who is producing grain that he should have as much water on the same kind of soil and similar conditions as the man raising alfalfa? And yet we proceed to give him just as much. Now just note that there is a great difference in the amount of water used by the different crops. It is anywhere from 157 pounds to 450 pounds for red clover. There is a very wide margin there.

Now let us go back again. If it takes a certain amount of plant food to build up that crop, that plant food must be taken from the soil together with what comes from the air. Now if you dilute that food in 500 pounds of water, it is reasonable to believe that it is going to take 500 pounds of water for the plant to make that given pound. If you dilute it in 1,000 pounds of water, it will take 1,000 pounds. In other words, the stronger our solution, the less water we will use. We undertook to demonstrate that. I had to send all the way to Illinois to get soil which contained no plant food. I could not find it anywhere in the West. I took a water solution and I added to the solution what these plants take from the soil in different amounts. The first solution I made at one one-hundredth of one per cent. strong. That is very weak. That contained potash, hydrogen, sulphur and lime and all the other necessary ingredients. From that on the percentages came down to one-third. Now here are the results. In this case it took 1,800 pounds of water to produce 1 pound of plant, and where we had it one-third it took 236 pounds. There is a very wide difference there, and it is due entirely to the strength of solution because all of the conditions were exactly similar and con-

trolled within the limits of experiment—so the difference is due to the increased strength of the solution.

Now that is a point that I wish to make, in the second case, that, first of all, different crops demand different amounts of water, and, in the second case, the condition of your soil will increase or decrease the amount of water that should be used. If you will remember these two different points we can proceed with some others. In this instance we wanted to see the age of plants. Now which is the more profitable production, a mature crop or one which is not mature? At the end of thirty days it took, in this instance, 519 pounds of water to produce 1 pound of dry matter in oats. At the end of sixty days 482 pounds of water, and at the end of ninety days it was 369 pounds. Now you can get a more economic use of water by bringing crops to maturity. That means that we must adapt to climatic conditions such crops if we are going to make the best use of the water supply.

The next chart will show the amount of available plant food. In this instance we grew blue-stem wheat after the first crop the first year. Now, wheat, if you keep on growing it, will take certain elements from the soil each year. If you keep on growing it, the particular elements on which wheat feeds most strongly will become weaker and weaker. Wheat after wheat was 487 pounds, and wheat after oats was 400. Wheat after corn was 460 pounds. Wheat after summer fallow 367 pounds. Now you will see that there was a chance for the plant food to accumulate the year before, and it was much stronger in this instance than in any other. Wheat after peas, 416; after clover, 310; and after alfalfa, 391. The kind of crop that you produce has a marked effect on the amount of water, in the first place, and the crop which precedes a crop has a similar effect. Now, of course, we have to prove our contention by getting results on a larger scale in the field.

Here is another chart showing the amount at different stages of maturity. This is in wheat. It passes from the minimum use of water from that standpoint to bringing crops to maturity, rather than harvesting them before maturity. Now the next chart is rather interesting. I have taken these different strengths of solution which may be used. This is one one-hundredth. This is the same as the second, where wheat was one one-hundredth down. It is interesting to us to take and harvest those plants, not from the ground up, but to take all the roots as well, and in the instance of the weak solution, we had the percentages shown here nearly forty per cent of the total as being your roots. In other words, that plant reached out to a great distance in order to get its food, because it was fed in a poor

food soil. That would leave sixty per cent for the crop above ground.

Now we come to the one-third of one per cent, and we see that seventeen per cent of the plant is root, and that eighty-three per cent of the plant is crop, or what may be harvested. Now this has a very, very important bearing on the amount of water. Here we used a lot of water and got very small returns. Here we used a small amount of water and got a large return. The plant that is fed on an unfertile soil returns nothing to the farmer, and the plant that is fed on a fertile soil returns the maximum amount to the farmer. Fertility does not mean the adding of manure alone—it means the proper cultivation of the soil. Just note the large differences from forty to fifteen or seventeen per cent. Under given conditions it occurred to us that the plant root might vary considerably and we went down to the depths that crops had travelled. We did that. Wheat took down to nine feet for food, oats to about 7 feet, barley $6\frac{1}{2}$ feet, beans just draw from the first 3 feet of soil. Plants which have the ability to draw only from the first three feet of soil are going to use a lot of water, because the solution from which they take their food is a very, very shallow soil, consequently it will become weakened. There are some exceptions to that, because potatoes are largely carbonaceous matter which comes from the air. We find that these crops take less moisture every given unit of production.

Now changing somewhat from the subject we have been discussing, you can conserve the moisture that has been placed in the soil by proper cultivation. I have been over 4,000 or 5,000 acres in the last few months and observed the condition of the soil after it had been irrigated. I am sorry to say that very few farmers take the trouble to conserve their water after they have it on their farms. All of you know that if you go out to your projects you will find that the last irrigation was less as it was turned on. Now, I want to show how much moisture is lost by evaporation. Here we have the different percentages of moisture on the crop—it is twelve to seven per cent. In thirty days we lost three inches of water where we had no mud. Here, with one inch of mud, we had less than half of one inch. If our irrigation farmers would only adopt cultivation methods, instead of trying to make water do what cultivation should do, we would get much better results. You will note the tremendous loss in these instances as compared with a slight cultivation on the surface.

The next chart shows the effect of using a large quantity of water, and gradually filling up the soil. Here it loses but two-tenths of an inch. Here it lost eight-tenths of an inch, and where it was within one foot of the surface, it lost a little

over two inches in thirty days. I know of many places where a water table has been raised till it is now swamped. I think there are thousands of acres in our own state, which were once of the very best quality land, which are now an alkali waste covered with stagnant water. You can see the rapid amount of evaporation here tending towards the alkaline condition.

The next chart shows where we lost two and thirty-one one-hundredths inches in two months, where you had ploughed up your ground and left it in large lumps. Here we have one thirty-five one-hundredths and here we lost eighty-six one-hundredths of an inch. Here we have a loss of about half an inch. Now there is a difference there of almost two inches between no amount and the proper amount. That is only cultivation. To-day there are thousands of farmers all over the West who are trying to make water and the irrigation manager do what they ought to be doing. (Applause)

They have gotten the idea that they must have a certain quantity of water; that their contract calls for it, and they are going to use it, because they are successful with that quantity of water they believe if they got more they would be more successful, and they will take all they can get, and they are always wanting more. The result of that is the swamping of large areas and alkali waste everywhere. I was over a project this summer which has been in operation three or four years. Great patches of this are unfit for cultivation, because of the alkali, and in two or three years they will have hundreds and hundreds of acres absolutely useless. Next door to that they are charging \$15 an acre for drainage purposes, because they used too much water.

We have in our state an irrigation farm in which we are determining the amount of water that is absolutely necessary to grow crops under different conditions. This is the effect on alfalfa. This is the yield in tons, this horizontal line, six, seven and eight tons. Here is the amount of water, and this is the amount used in acre-inches. To the first plot we applied ten acre-inches during this past summer, and we got a yield of 6.67 tons per acre. On the next plot we applied twelve and we got a yield of $7\frac{1}{4}$ tons. On the next plot fourteen inches, and we got a yield of 7.67 tons. Now here you will see the use of more water is profitable. Here we got 6.68 tons, and on eighteen inches we got 7.77 tons. When we got to twenty-two inches we got 7.81 tons. When we got to twenty-four inches of water, it dropped back to $7\frac{3}{4}$ tons, and here to $7\frac{1}{2}$ tons.

Here we reached the most economical application of fourteen inches. Here we have twelve acre-inches additional, which produce less alfalfa than if the twelve inches had not been put on, and if that twelve inches

had been put on another acre we would have had almost double the production that we got in this case. This is not a small experiment. It was conducted in a field, and I guarantee if any of you will observe the same rules of practice in cultivation that we did, you can observe the same as we did. There is no doubt about that. In this instance, if we had applied the same amount of water to double the area we would have got double the yield. There are many acres crying out for water to-day, and there are many acres crying just as loudly because they are getting too much. This is not right. We want that water spread over a larger area.

We have a still more striking result in the next test. During the last winter season we had about $7\frac{1}{2}$ acre-inches of water fall in rain-fall. Most of that was taken in and conserved, because we cultivated early. We had several plots of corn in another section of the same area, and, where we added two acre-inches plus the rain-fall, we got a yield of sixty-six bushels of corn. Where we added four acre-inches, we got a yield of seventy-four bushels. Where we added six inches, we got a yield of seventy-seven bushels of corn. Where we added eight we got the same yield. After that, all the way through to twenty-four inches, the curve goes downwards and the yield got less. At twenty-four inches we got less than sixty bushels. It seems that about at this point is the most economical use of water. At six inches, we got a yield of seventy-seven bushels of corn to the acre. That is plus the seven inches of rain-fall that was in the soil. Now this is twenty-four inches. If we had put that twenty-four inches of water over four acres, instead of one, we would have had four times the yield of corn, instead of sixty bushels to the acre. We would have had over 300 bushels of corn, instead of just sixty, as we have here.

That is a practical demonstration. We have convinced people of that district that that can be done. That was done on a loose, open, sandy soil with a good long growing season, but the people have been using too much water. When I get out of our own state they call me the soil and water specialist. Now soil and water mixed is mud, and you can call me mud if you like, but that is the condition that we found. There is not enough dry land on the farms, and too much water is the trouble—too much water. I believe that most of our projects can be more successfully operated, with larger returns to the farmers, on almost half the quantity of water. It is a question to which the engineers who are in charge of the project should give more study. Give it a practical and reasonable basis. If you are going to carry it on as you have been doing you will have

the same difficulties that you have had already. During the past year I have been called into the courts no less than twenty-one times on the question of the Duty of Water. A farmer will declare he has not enough. The irrigation manager will declare it is enough. The farmer believes he ought to have more. The lawyers and the jury and the court know very little about it. It is not their fault, it is a new phase. The lawyers may understand their law and be able to interpret the contract, but I have seen contracts which Solomon himself in all his glory could not have interpreted. Nevertheless, if these charts were observed, we could produce twice the amount of product if we used less water.



GRAIN EXHIBIT, IRMA DISTRICT.

We must get rid of that idea that more water will give more crop. More water never will. Those of you who are in charge of these projects, do what you can to cut down the water. You ought to do it, and you will be right in the end. Now if you will remember that, and do as I believe it can be done, cut down the water and increase the areas over which these irrigation waters can be spread, we are going to increase the crops of our western countries over two-fold. (Applause)

MR. E. C. BURLINGAME, of Washington: Will you please tell the delegates why fertilization does not make a big potato crop?

MR. THOM: Fertilization, where it is needed, does help to make a big potato crop, but potatoes as compared with wheat and alfalfa do not take the plant food from the soil that wheat and alfalfa do. Potatoes are composed very largely of carbonaceous matter which comes from the atmosphere.

MR. BURLINGAME: Is it not a fact that by cutting the corn before maturity we sometimes save a crop before it is too heavy?

MR. THOM: I would not care if they did not cultivate the last time as long as they did it every time before that.

MR. BURLINGAME: I think for ninety per cent of these people present, if you tell them how many inches are required for proper cultivation, it will enlighten us more. We would like to have those figures turned into acre-inches in rain-fall.

MR. THOM: This last chart is in acre-inches and we have these over some twelve different crops at the present time. This will be in bulletin form in the fall, but I simply wished to illustrate my point that we are using too much water. We have this on twelve crops.

MR. E. F. BENSON, of Washington: Will you tell us why those last four inches did not make any particular change, but the twenty-four inches showed a little increase?

MR. THOM: It may have been that there was a difference in the soil. This was on raw land, and we had to level it. It may be that a little surface soil was pulled on to that. There is always that chance and that much difference in field work.

MR. BENSON: How about the rest of the field?

MR. THOM: These are all on half-acres, on a five-acre tract, and it was all the one soil.

MR. BENSON: How was the water measured?

MR. THOM: Over a four-inch weir. The run-off was five per cent. We collected that and it averaged five per cent of what we put on.

MR. BENSON: And the amount of rain-fall was how much?

MR. THOM: Seven inches, a little better than that.

MR. HENRY SORENSEN, of Alberta: With regard to the duty of water which you are advocating now to effect

water-logging, I take it that you are an advocate of a large head of water to put the water quickly over the land to avoid water-logging.

MR. THOM: If you have a close texture soil you must take time with a smaller head.

MR. SORENSEN: Yes, but the land at the head gate would get a heavier soaking.

MR. THOM: You must put it through rapidly, yes, but not maintain a heavy head. The thing to do is to use a less number of furrows to begin with.

MR. NEWELL: Mr. Chairman: I want to express my great appreciation of this presentation by Mr. Thom. It has been a matter which has been more difficult for us to get a conclusion on than anything else. We had to assume a quantity of water which was very liberal and the result has been that we are threatened with water-logging. I suppose twenty per cent of the present areas are now water-logged. We are trying to arrive at a solution of the difficulty in a way which seems to be the only practical way. We can present to the farmers the great importance to them of the excessive use of water, but they will persist in using it because they have paid for it, and a little water is a good thing, so a lot is better.

Now we can appeal to a man's reasoning, but that is not so effective as to appeal to the other nerve, the pocket nerve, where we can put this water distribution on a basis of dollars and cents. "You can have more water but you must pay for it. You must pay more in proportion to the amount you use. We will give you one acre foot for fifty cents, we will give you another on top of that for sixty cents, and another for seventy-five cents. If you want eight acre-feet you can take it, but you must pay in proportion." That is the only argument so far which has been able to reach our friends.

MR. TREGO: I would like to thank Mr. Thom for his remarks regarding the benefits of irrigation in this particular district. Now we do not want the delegates here to think that we are opposed to irrigation, but we do believe that we have enough moisture ordinarily to make better results without irrigation than with it. I have here a report of the Minister of Agriculture, which Mr. Dennis mentioned a minute or two ago, in which he mentions that the average rain-fall in our district for the last seven years is over fourteen inches, and I understand that this is just about what is necessary to produce the best results, and it has been our experience during the last seven years that we get better results by proper dry farming than we do with irrigation,

and I defy any one to attempt to raise better crops with the rain-fall and irrigation, than without irrigation.

MR. CAMPBELL of British Columbia: (Remarks inaudible to reporter).

MR. THOM: You can have those by asking for them from the Director at Pullman, Washington. There is enough reciprocity between Washington and British Columbia to let you have them.

At this point the meeting adjourned until 9.30 A. M., October 7, 1914.

SIXTH SESSION

WEDNESDAY, OCTOBER 7, 1914

9.30 o'clock a. m.

The Congress was called to order by President Young.

PRESIDENT YOUNG: Under the constitution of our Congress the Chair has the appointment of the temporary Chairman of the Committee on Credentials and I take pleasure in appointing Mr. J. A. Happer of Texas, as temporary Chairman of that Committee.

SECRETARY HOOKER: The Chairman of the Committee on Resolutions, Mr. Hinkle, has called a meeting of the Committee in the Sun Parlour at the Palliser Hotel. The meeting will be held immediately following the adjournment of the Congress this afternoon. Mr. Hinkle has requested that those having resolutions which it is desired to bring before the Committee present them as early as possible.

Under the rules of the Congress, general resolutions after reading by the Secretary shall be referred to the Committee on Resolutions without debate, and no resolutions shall be received later than Wednesday without unanimous consent.

Mr. Newman, the Chairman of the Committee on Permanent Organization, has called a meeting of that Committee in the Sun Parlour of the Palliser Hotel at 1.30 o'clock to-day.

Mr. Happer, temporary Chairman of the Committee on Credentials, has called a meeting of that Committee immediately following the adjournment of this morning's session. The Committee will meet in the registration headquarters to go over the credentials.

Mr. Miller, the Secretary of the Board of Control, requests that the attention of the delegates be called to the fact that the railway certificates to be validated must be handed in to the headquarters or to Mr. Miller by noon to-day. It is important that those who have certificates, who have not yet handed them in, attend to that this morning.

PRESIDENT YOUNG: I feel, gentlemen, that I may be the subject of some criticism for not beginning this meeting on time, but I desire to state that when I walked into this hall at 9.30 o'clock this morning I was the only person here and it is difficult for the Chairman to hold a Congress all by himself.

Our first number on the programme this morning is by Mr. Kurt Grunwald of Colorado. He is one of the Vice-Presidents of the Congress, and a member of the Executive Committee of the San Luis Valley Drainage Association. (Applause).

Address by

Kurt Grunwald

Consulting Agriculturalist; Member Executive Committee San Luis
Valley Drainage Association

FARM DEVELOPMENT IN THE ARID WEST

Mr. President, Ladies and Gentlemen:

In facing the problem of farm development in the Arid West we face the entire problem of the development of this great section of the United States and Canada, for, it seems to me, there is no other development possible. Like all great problems, this one resolves itself into the capacity of the individual in the last analysis.

The development of the Arid West depends upon its farms; the development of the farm depends upon the farmer; and the development of the farmer depends upon..... For the moment I leave that sentence unfinished. We may, and probably do, have varied ideas as to whom or what that depends upon. We all agree, I think that the development of the farmer is the root from which the plant of western prosperity must bloom and bear its fruit.

For my own part, I believe the development of the farmer is as much the duty of those interested in the development of the Great West as is the building of great irrigation systems, or the selection of suitable tracts of land. The finest tools in the world are useless without the men trained to their use. We all of us, I believe, have seen this amply proved in the history of irrigation in the western part of the United States and Canada. Great irrigation systems have been constructed; vast tracts of land have been made possible of enormous yield, and results have failed to approximate expectations. Why?—Because the settler did not know how to use the tools that had been put into his hands.

Then the demonstration farm came in. It was a step in the right direction—a great big step—but even at that, it did not go far enough.

In many of the newly settled districts of the irrigated West, the work of the demonstration farm has not reached far beyond its own boundaries. The farm, as a farm, has been entirely successful; but as a demonstration to the settler of what he can do with his own land, it has made comparatively little progress; for the reason that the settler has failed to grasp the lesson it contains.

Of the value of the demonstration farm, there is no question. It should be the farmer's inspiration. It shows him what

his land is capable of; it gives him a goal toward which to work; but it has one great fundamental drawback. It is generally undertaken under ideal conditions—something that seldom falls to the farmer's lot. In a somewhat extensive experience in demonstration farm work, the criticism—if such it be—that I have most often encountered is, "Well, that's all right, you get the results; but so could I if I had had the same chances. What I want to know most of all is, how I can get better results with what I have got to work with. I haven't the money to get the equipment. I simply can't do what you did. I'm doing the best I can with what I've to work with. Show me how I can do better under the conditions that I have to work—not under the ideal conditions that I have not."

The farmer is right to a great degree. He needs more than the demonstration farms. Let us have the demonstration farm, by all means, but let us not stop there. Let us have in addition, some one with a clear conception of each individual farmer's handicap, who can show each farmer just how much of the work done on the demonstration farm he can do on his own place with his own resources.

Often the demonstration farm, undertaken by a great corporation or by a government, as the case may be, is a source of discouragement to the new settler. He sees a tract of land similar to his own brought quickly to a high state of fertility and productiveness. He is enthusiastic over the result, until he, himself, tries to do the same thing with his own place. Then he is apt to get discouraged. He has looked at the thing as a whole, and he can only use a small part of what it teaches him at a time. More than often he doesn't know which part of the lesson he can apply to himself. He gets the wrong part—makes a failure, and demonstration farm work becomes a mighty touchy point with him. Had that farmer been shown just what to do by someone who understood both demonstration farm work and the individual needs and resources of the farmer himself, results would have been attained—the farmer's resources would have expanded and he could have done more the next season, and more still the season after that,—until in due course of time he could draw a comparison between his own place and the demonstration farm—and "wear the smile that won't come off." He'd have a demonstration farm of his own.

The value of such an adjustment between the demonstration farm and the individual farmer is clearly understood in Europe, where it has been considered one of the essentials to successful farming for years. When I was serving my apprenticeship in Germany, and later as foreman of one of the largest estates in Russia, this fact was impressed on me almost daily. When I came to this country, the absence of such an adjustment surprised me. Eleven years of work as

a practical agriculturist and irrigationist, throughout the Western States, have thoroughly demonstrated to me the necessity for such an adjustment.

Let it be understood that, throughout this paper, I am not speaking of the established, experienced and efficient farmer, who is amply able to take care of himself. I have in mind the settler on new lands, in a district, or under governmental or private irrigation projects. To most of these conditions are strange. To a great number, farming itself is practically unknown art.

Under the system of acquiring land in vogue in the United States, a large portion of those holding land,—of those responsible for the development of the land,—are not farmers, but are persons from different walks of life, who see in the acquisition of land a means to independence. Those persons know practically nothing of farming. They have everything to learn. Add this tremendous handicap to the natural obstacles offered anywhere in the development of new land, and some idea may be gained of why land, under irrigation projects, is not showing the results expected. Briefly the principal obstacles to successful farming in the Arid West are:—

Too large individual holdings:

Insufficient equipment;

Lack of systematic preparation of the soil and of careful seed selection;

Indifference to the importance of crop rotation and diversification;

Ignorance of the proper duty of water and of its method of application;

Wastefulness in the field, in the market, and in the home;

Want of thorough understanding, on the part of some of the settlers, of the attitude and purposes of those responsible for the development of the land, and a smaller degree of co-operation than might otherwise be obtained.

I find that the average settler takes up more land than he can properly cultivate. Approximately a little more than one-half of the land is under cultivation. It follows that the entire burden of taxation, land and water payments, interest, etc., falls on the cultivated land, and that results do not show up as they should when figured against his entire holdings.

This lack of development is due to various reasons. Some of the settlers are not financially able to place all of their land under cultivation. Others are able to do so, but either fail to see the importance of the feature, or are holding the raw land as a speculation. In other words, allowing the industry of the settlers about them to increase the value of their idle land. I find in too many instances, that the equipment of the settler is insufficient to get proper results. Farming machinery can take care of only a portion of his land, and furthermore.

it is subject to heavy depreciation, because it is allowed to lie in the fields or the barn yard, because of lack of buildings in which to house it. This item also comes under waste.

Lack of proper shelter for the livestock results in considerable loss of market value in the animal, and lack of storage facilities for feed operates heavily against livestock in times of snow and storm.

There is a regrettable disregard of the importance of fall ploughing. Too much stress cannot be laid upon this item—in the success of the irrigation farmer. Deep tillage in the fall enables the soil to absorb moisture from the winter snows and frosts in a quantity not possible in any other way. It is undeniable that land ploughed deep in the fall will require one-third less water during the growing season than land not so prepared. In other words, land, so prepared, will grow one hundred per cent. crops with one-acre foot of water; where land not so prepared, will require not less than eighteen acre-inches.

Fall ploughing also has this great advantage,—that it takes from the farmer much of the burden of the heaviest item of spring work and enables him to prepare his seed bed much more carefully.

This disregard of the importance of fall ploughing is the most serious criticism I have to make of the methods of preparing the soil now in vogue among the majority of settlers, but I would also recommend that more attention be paid to proper rolling or packing of the fields, after the spring turnover, so that a compact seed bed would be secured; that a more careful selection of seed be made, and that there be a considerable increase in the amount of cultivation given to growing crops.

I am of the opinion that the pursuance of such methods would increase the crop yield at least twenty-five per cent.

Conditions in general, in regard to crop rotation and diversification, leave much to be desired,—and this is, perhaps, the largest single item in the "MUSTS" of the successful irrigation farmer.

The first condition that faces the farmer on irrigated lands in the Arid West, is the absence of humus, or organic matter, in the soil. To a considerable extent, the very characteristics that make the arid land so desirable, when irrigated, are necessarily inseparable from their lack of humus at the start, and, therefore, the supplying of humus, should be treated as one of the steps in preparation of arid land—exactly like supplying an irrigation system. Vegetation, through lack of moisture, has ever been sparse on these lands. Naturally before the farmer can expect any considerable yield, he must supply this deficiency, when his land "comes under the ditch". Without humus, his soil does not retain moisture well, nor does it contain as much plant food as a good crop will require.

The best method for supplying this humus is the planting of alfalfa, field peas, lupins, or some other legume plant, and the ploughing under of as much of the crop as is possible.

In the western irrigated section of the United States, it has been proven beyond a doubt that alfalfa (Lucerne) is the most valuable crop for this purpose. If the final cutting of Alfalfa, knee-high, is ploughed under in the fall, after it has been grown for three years, the best authorities state that the benefit to the land in humus is equal to about twenty tons of manure to the acre.

Closely allied with this matter of soil fertilization is the rotation and diversification of crops.

The term "rotation of crops" names a system of farm practice which groups field plants with different food requirements, so as to give a definite cycle of crops in recurring or successive order. There are three primary purposes of a crop rotation and diversification:

1. Prevention of crop-sick soils. This is the result of continuous cultivation of the same crop for a period of years on a given piece of land. A greatly lessened yield is the invariable result of this continued cropping.

2. The elimination of weeds, insect pests and crop diseases.

3. Maintenance and increase in the productivity of the field crop by conserving soil fertility.

Ignorance of the proper duty of water and of the manner of distribution is startlingly apparent among the farmers of the Arid West. It is safe to say that not more than one out of ten understands the elementary principles of this question. The prevailing idea among irrigation farmers is, to give their land all the water they can get hold of. Too much water is just as harmful as not enough water, yet ninety per cent of irrigation farmers have no idea whatever as to what is enough water and what is too much. Also much water is wasted through negligent preparation of the seed bed, indifference to the proper levelling of the field, and the misplacing of laterals. The subject of the proper duty of water and of the method of its application to the soil is so broad that it is impossible for me to go into the question at this time, but it is undeniable that the proper education of settlers in this matter would result in great benefit to them, and would enable the water supply to cover at least 33½ per cent more land.

In the matter of waste on the farm and in the home, there is much to be remedied. Lack of system on the part of the farmer, failure to understand the business routine absolutely essential to the success of any other form of enterprise, has always been found on the farm. Successful farmers of the West have demonstrated that the basis of farm success is the exercise of the same general principles of efficiency and

economy that apply to what is generally classed as the business world. The loss of time resulting through failure to lay out a systematic campaign for their farming operations is another big item of waste.

In the first place:—farmers are wasting heavily through their failure to work their plant at capacity; in the second,—there is great waste in their method of operation: and in the third place,—they lose heavily in actual cash through their failure to raise for themselves many things which they now have to purchase. Their failure to work their plant at capacity has already been gone into under the head of a generally too large unit of holdings. Haphazard farming is expensive farming. The largest part of a farmer's capital is the time he puts into labour. Deterioration of machinery through failure to house it when not in use is another big item. Insufficient shelter and care of livestock results in heavy loss in the marketable value of the animal, if it be destined for market; and in efficiency, if it be a work animal.

Failure to realize the number of milch cows, poultry, etc., that can be kept on the farm without extra expense, is another.

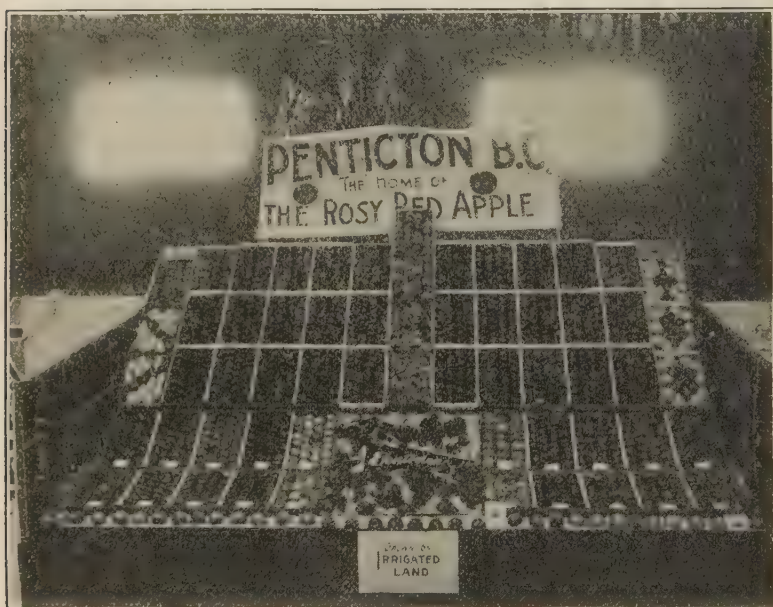
In the home there are innumerable instances of minor waste, the total, however, forming a not inconsiderable yearly total, especially when it is considered that this is a part of the farmer's cash outlay.

I found settlers buying meat at high cost, when they themselves were shipping cattle, hogs and sheep to market. I found settlers buying condensed milk, when there was room for a half dozen or more milch cows on their place. I found settlers buying vegetables, when there was idle land almost at their door, sufficient to raise many times what they would consume. The elimination of waste is merely a matter of education. I am certain that most of this would be rectified if the settlers were once shown how simple it is to do so.

This brings us to the question of co-operation between those responsible for the development of the land and the settler. There are plain evidences of the attitude on the part of some of the settlers, that has proved one of the most annoying problems in every considerable irrigation enterprise which I have seen in operation in the last eleven years:—A feeling on the part of some of the farmers, that notwithstanding all that has been done for them, the only intent of those responsible for the development of the land is to exploit them, and having sold them the land and water, their only remaining concern is the collection of payments. This attitude may be considered an inevitable feature of any enterprise. It is this lack of resource and failure to understand irrigation conditions that causes most of the troubles.

Experience has shown beyond question that the failure or success of irrigation projects in the West, both private and

governmental, has depended largely on the ability of the new settler to get through the first years. A stranger in a strange land, he must have some one to guide him in regard to physical conditions and someone to lean against for financial support. Except in the most isolated cases, his capital is so small that all returns from the farm must go back into the farm for quite a number of years before he is what could be safely termed prosperous. He acquires the necessary equipment of machinery, buildings and livestock, very gradually, and he is not getting proper returns from his "plant" until his equipment is secured. The sooner he acquires that equipment and learns what the capacity of his plant should be, the sooner he is



PENTICTON APPLE.

prosperous. There can be no question but that the prosperity of any irrigation enterprise rests upon the prosperity of its settlers. It is, of course, out of the question to require of those responsible for the development of land to equip the settler and to run his farm for him until he is able to make a large profit himself, but there are many things that can be done which will materially aid the settler and at the same time bring about a spirit of co-operation.

In general, however, I would suggest that the services of an expert agriculturist, not only as regards the physical condition of crop raising, but also as to general conditions

prevailing among settlers, would prove extremely valuable to any community. A thorough investigation by such a man would undoubtedly result in the formation of a plan of procedure that would materially increase the amount of land under cultivation, raise the yield of the crops and conserve the expenditure of the farmers.

Find the men who can demonstrate the working of the demonstration farm to the individual farmer. Mobilize them into an army of invasion for a campaign into the land of Ignorance. Turn the flank of Discouragement with a cavalry charge of Practical Information. Raise the fortresses of Failure with the siege guns of Intelligent Endeavour, and you will bring the great country of the ARID WEST under the banner of Prosperity, with never a wish on the part of its inhabitants to belong again to the dual monarchy of Ignorance and Failure.

Mr. President, Ladies and Gentlemen, I thank you. (Applause).

MESSAGE FROM GOVERNOR HANNA

PRESIDENT YOUNG: I am in receipt of a communication from the Governor of North Dakota, as follows:

Bismarck, N. D.,
Oct. 3rd, 1914.

"Hon. Richard W. Young,
Calgary, Alberta, Canada.

My dear Sir:—

I wish to extend through you the best greetings of North Dakota to the International Irrigation Congress and hope that the Congress may be of great benefit to the cause of Irrigation, both in the United States and Canada.

Sincerely,
(Signed) L. B. HANNA."

Is there any discussion respecting the paper which has just been read? Under the rule ten minutes will be devoted to discussion if required.

MR. C. E. LAURENCE, of British Columbia: While endorsing regarding the demonstration farms being an inspiration to a farmer, I would like to ask if there is not a Commission of Conservation which really covers the ground which has been mentioned in that paper in making good the necessary information, or the necessary knowledge which a farmer requires.

I would add to that question that we have such a Commission of Conservation in Canada, and it covers pretty well the whole of the Dominion, and the assistance that is required

is given out by means of expert farmers stationed in different parts. For instance, there is one here in Calgary whose district extends far into Manitoba and into British Columbia. I am speaking now for the work he is doing in British Columbia, and I can only speak of it in the highest terms as illustrating on our own land exactly the result which can be obtained from certain methods of cultivation. Now it seems to me that, with that Commission of Conservation at work in the United States, and I know that there is such there, it seems to me that the very lack of information which is spoken of by the speaker should be supplied.

MR. GRUNWALD:—Each of our states in the United States have an agricultural college. They have extensive work in agriculture which covers experiment stations. Also the Agricultural Department has a branch which is known as "Farm Management," the counties in many states have experts to go and help to teach the settler in agriculture and irrigation. Now, as speaking from Colorado, we have ten men whom we call "County Agriculturists." I know the State of Utah, where our President comes from, has about eight or more and all of our western states are endeavouring to hire those men to teach the farmers. Does that answer your question?

MR. LAURENCE: Yes sir, but I would like to know whether that is not covered by the Commission of Conservation?

MR. GRUNWALD: I would like to call on Professor Ball of Utah to answer that.

PROF. E. D. BALL, of Utah: The Conservation Commissions, as far as I know, have almost entirely different duties. The duties are seeking out the resources of the state, but the actual conveying of the information to the farmer is entirely entrusted, in most of our states, to the Agricultural Colleges, through its extension department, as Mr. Grunwald has stated, and that is conveyed to the farmer directly by the county agriculturists or field men, whatever you may call them. Besides that, almost all of our agricultural colleges in the States maintain a staff who are not assigned to any county, but to the state at large. There will be a specialist in irrigation and a specialist in husbandry. For instance, if a man wants to establish a draining system the specialist will go there and stay there until it is established, so that the state maintains two forces that are for the benefit directly of the farmer. They carry this information directly to the farmer. The county agent is the go-between; and the specialist, and the farmer are the two who are brought together. The agent goes around and gets into touch with every farmer in his county and finds out that farmer's particular problem. He is

the go-between, the man who finds out the problem and knows where to get the information, and then from the specialist and the agricultural college he gets the information and delivers it to the farmer. (Applause).

MR. W. J. THOMPSON, of Saskatchewan: Firstly I want to congratulate Mr. Grunwald on the paper he has read, because it helps to interpret the human equation on the land, the human elements. It was very pleasing to me, as one on the land myself, having no other resources but that land, to hear the interest which has been represented at this Congress on the part of the business men and professional men, engineers especially, preaching these doctrines. It is not irrigation works, or engineering works, but it is the human elements that have to be dealt with. I have been very much disgusted lately to hear business men on the train. I heard it coming here from Winnipeg, sitting there smoking their cigars in the pullman, criticising most volubly the cussedness of the farmers not making more use of the experiment stations. We all know that the experimental stations of this country have discovered more things in the last twenty years than the farmers will be able to use in the next one hundred years.

I think it is about time that we took a leaf out of the corporate interest book and put it in the book of the farmer. I observe that a branch of a packing house in Calgary has recently been having visits from four experts. Now, how are we going to help the farmer to get more out of his land and market it at a better price? They take the young man out of the high school into the packing business and he is put under a manager and he gets ideas. He is promoted eventually to the management of the branch house. It is not taken for granted that he knows all about the packing business in this time. He is expected to market poultry and butter and pork and sausages. Now what do we find? We find that a specialist in Chicago gets over the ground and goes to the individual customers all over the city. Next comes along a specialist in butter or poultry.

Some of us in this country know what we would like to do, but we cannot do it. I have been confronted with the problem of digging twelve acres of potatoes and I am in the face of a disaster I have never heard of. I had to telegraph to the experimental station before I could get any attention. It seems to me the time to deal with the farmer is to get at the man when he gets on the land, and to co-operate with him at the time, and not wait until he gets up against something and gets grouchy and cusses, and then gets out of the country. Now I think we want something of the county agent style which you have on the other side of the line. I am glad though that they are waking up to the fact that there is no more inefficiency among farmers than there is among business

men. How are you going to deal with this question? Let them provide practical helpers for us through the human personal touch. (Applause).

PRESIDENT YOUNG: Our next number is "Water Administration in British Columbia," by Mr. William Young of British Columbia, who is the Controller of Water Rights in that province. I have the pleasure of introducing Mr. William Young. (Applause).

Address by

William Young

Comptroller of Water Rights for British Columbia

ADMINISTRATION OF WATER RIGHTS IN BRITISH COLUMBIA

Mr. President, Ladies and Gentlemen:

The history of water administration of British Columbia for the past fifty years may be said to be the history of water administration of several of the Western States of the Union south of the international boundary. From the time when the province was a Crown Colony the ownership of the waters in the rivers and streams has been vested in the Crown, and in the circumstances, water rights were granted through a period of well over forty years, but unfortunately in those days in an unmethodical manner. The result is that there are streams that have been over-recorded many times, and again, many of these records are a hundred-fold in excess of the requirements for which they were taken out. Although throughout those years there was a water law that provided for granting of rights, such law contained no machinery for administration afterwards. Because of this weakness in the law and the fact that records were granted by government agents in different sections without reference to a central authority, the final condition became one of chaos. Just as some of the states to the south of us have faced a similar condition and set things in order, so have we had to set about this work, a beginning being made in 1909, when steps had to be taken to terminate the growing confusion. No organized effort was made, however, until the summer of 1912, when the Hon. Mr. Ross called in able advisors to formulate a system and advise the best method of undertaking the work.

Now I have little if anything new to present to you in the administration of water rights in British Columbia. In taking up the many problems that confronted us we went about it in the same manner that the trained scientist undertakes some new field of research. An effort was first made to ascertain

what had been done in other countries, particularly the Empire and the United States of America. While amendments to the Water Act were made in 1913, the results of organized effort may be said to have crystalized in the amended Act of 1914. We do not claim that this Act as it now stands is perfect, far from it; but during the preparation of amendments for the Act, complete organization of office and staff had been well advanced, current work taken care of, an order of work established and the problem of handling the large quantity of arrears commenced. As regards investigating the work that other countries have done, it may be said that we have just entered on the border of a vast realm; for of all applied science irrigation may be said to be the oldest, not to say anything of water power or waterworks.

The foundation of our administration of water rights is our water law, as it is in all of the states represented at this Congress. What follows hereinafter is a very brief analysis of this law; an outline of our order of work; a few remarks in respect of administrative problems and in conclusion how the administrative staff deal with the work before them and the principles that must govern their actions if success is to be the reward.

The basic principle of our water law is set out in the beginning in the declaration that all the unrecorded water in any stream is vested in the Crown in the right of the province. Then the purposes for which water rights may be acquired comes next. Organization and administration is then taken care of. Procedure in the acquirement of water right follows, and then the organization of communities, associations and municipalities, and lastly the Board of Investigation, its functions and procedure.

Under the chapter "Organization and Administration," the law briefly authorizes the appointment of the Comptroller of Water Rights, and the Board of Investigation, each with specific power, and appointment of district engineers, also with specific powers, the division of the province into water districts and the appointment of water recorders. The law sets out the administrative duties and powers of the minister; also those of the Lieutenant-Governor-in-Council. With respect to the latter, one of the most important powers is that of making rules and regulations for the carrying out of the spirit, intent and meaning of the law. With this basis to work on the organization is elaborated.

The Comptroller of Water Rights issues all licenses and administers the Act in accordance with the rules and regulations in their application to the various purposes in which water may be used. He is also empowered, with the approval of the minister, to carry on such topographic surveys and other engineering investigations as may be in the public

interest. The Board of Investigation was created for the purpose of hearing claims, determining old rights and adjudicating thereon. The Lieutenant-Governor-in-Council or minister, may however refer any matter, question or thing to the Board for the purpose of obtaining information or making any enquiry thereon. As constituted, the Board normally consists of three members, two of whom shall form a quorum. The Comptroller of Water Rights is ex-officio a member of the Board in all matters excepting those pertaining to old records. The division of the province into water districts is in the interest of effective administration and the engineers appointed to supervise such districts have stated powers to enable them to enforce "beneficial use" of water and settle disputes; in other words, the district engineers represent and are deputies for the Comptroller of Water Rights. The Water Recorders, usually the government agents, act as representatives of the Comptroller to the extent of receiving applications for water rights, such applications to be filed with him and advertised, so that the neighbours of the applicant may have an opportunity of ascertaining if their interests are affected. The rules and regulations deal in particular with petitions, surveys, plans, fees and rules covering the use of water rights.

It is not the intention at this time to enter into any description of how water rights may be acquired for the reason that the ground has already in a measure been covered by the Honourable, the Minister, in his paper. One point in respect of the procedure I would however refer to. It is this, the procedure is now simplified in the interest of the settler. It is now comparatively easy for him to make his own application. It was always possible for him to do so but owing to the unfortunate arrangement of our acts and doubt in respect of some sections, he usually called in a lawyer. He no longer does this. Already this feature has proven a boon to many a pre-emptor or small owner to whom a lawyer's fee would be a charge they could ill afford.

The purposes for which water rights may be acquired are 14 in number, and, although they are all important, three great purposes stand out with prominence.

1st. Irrigation whether by individual, community, company or municipality.

2nd. Water power.

3rd. Water works.

A broad distinction in the purposes may, however, be said to exist.

"Purposes that affect the public interest" and

"Purposes that affect the individual."

Around these purposes our administrative machinery may be said to be constructed and in their light the department is

now in a process of organization for effective and efficient administration.

The creation of the organization we now have may be said to date from 1910 when the administration was centralized in Victoria. During 1911 and 1912 considerable progress was made, in working out a system adapted to the business of administration, in expert investigations of conditions, and in formulating an order of work. The year 1913 witnessed the division of the province into water districts, the opening of branch offices and the appointment of district engineers, also a united effort in the preparation of rules and regulations for the administration of the Act, and important amendments to the Act, among which may be mentioned a chapter dealing with irrigation, whether by community, company or municipality, and which has been referred to at some length in the paper given by the Honourable, the Minister. Very important amendments to the Railway Belt Water Act were also made, whereby the administration of water rights in the Railway Belt finally passed from the Dominion to the province, and as an outcome of this the B. C. Hydrographic Survey was organized for systematic work throughout the province.

The effective work of administration may be said to have begun in this year, and that there might be uniformity of effort, the order of work referred to as having been adopted in 1912 was slightly revised to meet the conditions. It is as follows:—

1. Investigation of old records.
2. Systematic and continuous work in stream gauging.
3. Study of the proper duty of water.
4. The prevention of wasteful use of water.
5. Policing of streams.
6. Economic distribution and delivery of water.
7. Inspecting water systems to determine their efficiency and safety.
8. Determination of storage possibilities.
9. Investigation of water powers.
10. Investigation of sources of domestic water supply.

You will note that this order of work involves the three great purposes referred to, and which are, in each particular district, of more or less importance. You will note, however, that investigation of old records comes first, and necessarily so, for the very good reason that effective administration was quite impossible until the chaos of almost fifty years has been cleared up. Under these circumstances the efforts of our district engineers have been largely concentrated on engineering investigation of those records, although every line of work has been given more or less attention. There are about 8000 of these old records, practically all of which have now been reported on, and these preliminary reports have been of great

value to the Board of Investigation. The hearings now held by the Board are very different to those first held without these preliminary engineers' reports and the success resulting from the efforts of this tribunal during the past two seasons, and referred to the Honourable, the Minister, is as much due to these reports as to anything. We are hopeful that the measure of success referred to will continue. In some of the districts this Board work is now complete, and we are now fortunately in a position to follow more fully and carefully the various other lines of work, with results that have been most encouraging.

I have referred to three great purposes as being of public interest, viz: Irrigation, Water power and Water-works. Since the difficulties met with in administration largely centre around these, we will refer to them in order.

DEALING WITH THE ADMINISTRATION OF WATER FOR IRRIGATION

Prior to 1914 there was no provision in the law that would enable the officers to cope with the conditions that already existed, and under the circumstances their hands were in a measure practically tied. The Water Act of 1914, however, included new sections which involved basic principles and made administration for irrigation possible and effective. These principles are:—

1st. "*Limiting the quantity to beneficial use,*" that is to say the quantity of water used per acre shall be limited to such quantity as experience may from time to time indicate to be necessary for the production of crops in the exercise of good husbandry.

2nd. "*Rotation in use,*" when a number of water users may arrange a system of rotation that will best meet the requirements of growing crops and at the same time secure an economic use of the water.

3rd. "*Consideration of the particular crop grown,*" a provision which opens the way for adjustment, that is in the interest of the community as a whole.

It is not my intention to take up your time in an argument of what kind of crops should be grown. I do not consider myself qualified to discuss such an important subject, but as respects these principles and their administration I am reminded of a statement credited to Sir William Wilcocks, and in reference to the control of use of water in the prevention of deterioration of land, as follows:

"In this respect the government is autocratic and can and must enforce the regulations devised by its experienced advisors. It need not await the slow education of the great body of water users before adopting those practices which experience has shown are necessary for the general prosperity."

For the administration of these principles the powers of the district engineers were enlarged, and in carrying out "Rotation in use" they may arrange when necessary for the appointment of water bailiffs whose duties are clearly set out by the Water Act and whose authority is backed up by the Police and Prisons Act. These principles and the provision for their enforcement are not new. In referring to the history of irrigation, particularly in countries where it has been practised for centuries, we are told;

"That the water that irrigates your field has to flow in a channel which passes the field of all your neighbours and which cannot be maintained in a state of efficiency unless all do their duty. It is easy to understand how method, order and obedience, to a properly constituted authority very soon developed themselves."

"We are also told how autocracy was introduced into a free community of irrigators on small independent canal systems and in times of difficulty the irrigators chose from among themselves a dictator for the whole period of scarcity of supply and his orders are obeyed and respected as though he were an Absolute Monarch, and further that they invariably chose a good man."

In short, success here may be said to depend upon the human equation and we have kept in mind these facts of old world practice in the appointment of bailiffs, insisting upon these men having the confidence and respect of the communities in which they reside. The result of the introduction of these principles in some districts where water feuds have existed for years has been most encouraging. Irrigators have again become friends and neighbours, realizing that their individual success and prosperity meant the prosperity of the community. In one particular instance where an order of rotation of water was instituted as the water became scarce it was found that some of the prior record holders had ditches that absorbed all the water in the creek before it reached their land. As this state of affairs became obvious the bailiff eliminated these record holders from the order of rotation in the use, and to the credit of these men it may be said that, although in other years they had caused trouble, they now acknowledge the justice of the bailiff's ruling, they could not make beneficial use of the water, and it was not in the interest of the community that they should prevent others from doing so.

Then there are other important features in the interest of irrigation that permit of effective administration and encourage organization that will mean not only development, but greater co-operation among farmers. These are—

- 1st. Organization of water users communities.
- 2nd. Organization of mutual water companies.

3rd. Organization of land and water companies.

4th. Organization of public irrigation corporations, or irrigation municipalities.

Time will not permit of reference to these, other than to state that enterprise has been stimulated in different farming sections. Irrigation communities are being formed and the department have now under consideration a number of petitions for the formation of irrigation corporations in respect of which the preliminary engineering work is well advanced, and it is hoped that the various conditions required by the Act as regards organization and management will be fulfilled during the coming winter, and that another year will see several irrigation corporations or municipalities in operation.

A few words now about:

THE ADMINISTRATION OF WATER RIGHTS IN THE DEVELOPMENT OF POWER

This purpose and its administrative requirements has received quite as much consideration as the purpose of irrigation. Recent amendments to the Act in this respect were few but of great importance. It is no longer possible for a company to organize with the minimum of capital permitted by the Companies' Act for the purpose of carrying out an undertaking requiring several millions of dollars. It is now impossible for a purely speculative element to secure and hold indefinitely a valuable franchise. The administration in this respect is largely governed by rules and regulations that the Lieutenant-Governor-in-Council may from time to time make for carrying out the spirit, intent, meaning and purpose of the Act. In respect of development of power, these rules deal with surveys, construction, the operation period and fees. In regard to the companies now operating, the determination of the fees to be charged is occupying our attention. How such fees should be arrived at is clearly set out with an alternative; this alternative being that the fees may be based on a reasonable station output. For the present we are taking this as the average daily horsepower arrived at from the total output in kilowatt hours at the power house switch-board. As the old records are eliminated and licenses substituted therefor and the organization for effective administration progresses, we shall in due course go more fully into the question of fees basing such on the several factors set out in the rules rather than on the basis which has been adopted for the current year.

Hydro-electric power is essentially a specialty and to deal with it in a proper way a section of our staff will, in due course, give its whole time to its administration and study.

The problem of water power administration and policy is one of economic importance and the question that confronts

us is to what extent should the Crown become interested. On the one hand we have the example of a Hydro-Electric Commission of Ontario, the progress of which we must carefully follow, analyzing the reports and criticisms pro and con. Then there is on the other hand the necessity for encouraging investments of private capital, subject, however, to the principle that public utilities as natural monopolies must be under regulation by the Crown. What the ultimate result will be only the future can tell.



NORTH WESTERN STATES EXHIBIT.

As the province must know something of its assets in water powers, the work of stream investigation has been taken up. This work for the season now closing has been more especially in the Okanagan Valley and comprises topographic work, and stream investigation for power, reservoir investigation, stream gauging already having been arranged for. Small powers are not overlooked, it is only necessary for data to be made available to bring about development, as a small power may mean an important industry to a small community.

ADMINISTRATION OF WATER RIGHTS FOR THE PURPOSE OF WATER-WORKS

Administration in the issue of licenses and collection of annual fees in this purpose is usually plain sailing. There is, however, a phase of it that is of great importance and in the

public interest, "The investigation of the sources of domestic water supply, particularly of large centres or population." Many of these watersheds are still Crown lands, and the Crown as the land and water-lord, is in a position to practise "conservation." During the past two seasons a field party has been continually following out an order of work, as follows:—

- 1st. Determination of water shed area.
- 2nd. Extent of run-off.
- 3rd. Cruising to determine how much timber is merchantable and whether or not the timber as a whole is a factor in the regulation of stream flow.
- 4th. Cruising of alienated timber.
- 5th. Obtaining the area of alienated land and the purpose for which it is held.
- 6th. The investigation of other rights whether water or mineral, and what use, if any, are made of them.

In a new country like British Columbia the value of this work must become of greater importance as time goes on. With the co-operation of an active provincial Board of Health there will be, in due course, available data for the various centres of population that will be a guide in securing and guarding their sources of pure domestic water. The most important work in this respect now in hand is the survey investigation of the water-sheds from whence comes the domestic water supply of greater Vancouver. The results already obtained have enabled us to make equitable decisions in respect of licenses held by the municipalities who were at variance with one another. It is to be acknowledged that Vancouver must become a great city and a great railway and shipping centre. With this in mind we are compiling all the facts, and the protection of Vancouver's source of domestic water supply has been rounded out to such an extent that when the time comes to provide for larger demands there will be few difficulties in the way of obtaining the necessary authorization. Briefly, the situation in Vancouver is ready for the organization of a Metropolitan Water Board, which body must ultimately be created by the municipalities that comprise greater Vancouver.

I have referred to the lines of work of the district engineers as covering these three great purposes. And while I have stated that every line of work laid down has received attention in one or other of the districts, it has been impossible at the present date to give all the lines in each district the full attention they merit. For example take "Duty of Water," a work that will demand the whole time of one man, who must specialize, and whilst this is so, it is not the intention to relieve the district engineers of their responsibility, on the contrary their hearty co-operation is essential, and they will be required

to keep in touch with all work within their districts and to be here and there in the event of contentions arising.

Then there is stream gauging. When the province assumed from the Dominion the administration of water rights in the Railway Belt the latter decided to continue its hydrographic work. It was, however, considered that it would be advantageous to the province if it could co-operate with the Dominion along lines similar to those in operation in the United States. An agreement, accordingly, was arrived at, and we now have the B. C. Hydrographic Survey. The officers of this organization have no administrative powers in respect of water rights. Outside the Railway Belt their whole time is devoted to hydrography, results of their work being available to the Water Rights Branch for administrative purposes. Our district engineers are thus, to a large extent, relieved of this work, except in sections where irrigation is practised, and proper administration depends on a direct knowledge of stream flow. In this respect we have adopted the system in use in Oregon, charts being prepared to show graphically the relation of records to stream flow, from which it may be seen at a glance those licenses that have to depend upon storage, and to what extent a stream may be recorded on.

In conclusion, if the administration of water rights is to count for anything, the requirements of the different sections of the country must be anticipated. To this end we have concentrated our efforts on the Okanagan Valley, one of the fruit districts of the West. By the end of another season every stream will have been traversed, every reservoir surveyed and contoured, every watershed determined, and the timber cruised, classified and possibly reserved; stream gauging all the while having been carried on. In fact, a thorough water investigation will have been completed in anticipation of a development that must in time come. The problem of well drilling, in its application to bench lands, is also under investigation; and the problem of irrigation by pumping, with a view to obtaining and marshalling all the facts in respect of the practice in other countries, and how we may apply them to British Columbia, is now receiving attention.

In the general conduct of the administration of water rights, whether at headquarters or in the field, we are endeavouring to follow the principles of good business by giving prompt attention to enquirers and water users; unbiased decisions where there is dissension; and in being thorough and comprehensive in the field work and other investigations that we from time to time may undertake. I thank you (Applause).

PRESIDENT YOUNG: The discussion of this paper is in order.

MR. H. H. SHAW, of Alberta: I would like to ask Mr. Young a question on the subject of rotation. Do those who use the water last have the same chance as those using it first?

MR. YOUNG: The distribution comes in the order of priority. The first man has the first consideration, and the second and the third and so on. Now, they agree on a rotation for set times. If the whole five or six fit all well and good, but if it is found there is not enough water to give the five the full quantity, the last must drop out.

DR. CHAS. W. DICKSON, of British Columbia; I would like to ask Mr. Young if the department has taken into consideration the effect of the bond issues in connection with the proposed irrigation corporation on the credit of the land. This question arose yesterday in connection with the illustrating of the Irrigation Act of the Dominion, and I would like to ask if the department has taken that into consideration in this connection?

MR. YOUNG: Under the Irrigation Corporation Act, the bond issue is a direct mortgage against the land subject to existing mortgages. That is to say, if there is already a mortgage on your land that mortgage has priority over the mortgage constituted by the bond.

DR. DICKSON: How will that affect later borrowing? Some people said they found it impossible to raise money from the loan companies on irrigable land because of this other indebtedness. Has that been taken into consideration?

MR. YOUNG: We are working on that now. It will all depend on what has to be the maximum charge. We are endeavouring to keep within a certain limit, and, if we find that that limit has to be exceeded, it rests with the people themselves to determine whether they will go after it or not. If the tax as applying to schools and everything amounts to a certain figure all well and good, if it goes beyond that there is liable to be danger.

MR. W. M. EDWARDS, of Alberta: Something that I am particularly interested in is the question of water supply. It seems to me that the British Columbia Government should be commended for getting information ahead of the time that it is going to be used, but the difficulty is, when that information is required, it is so difficult to get data. I would like to ask Mr. Young if, in their water records, they are keeping records of rain-fall. Of course that is a very important feature in certain parts and I would like to know if your department is keeping records of that?

MR. YOUNG: Up to the beginning of last year, practically nothing was done. In one of the largest centres of population in British Columbia, during twenty years no record had been kept of rain-fall and no thorough investigations made of their water supply resources. Realizing this condition and the impossibility of judicating on certain questions, we determined on these policies and we have established ordinary rain gauges on every one of the water sheds, and we have encouraged the cities to do the same with the object of getting the maximum rain-fall in certain localities. What we are after, though, is to establish a hydrograph so that we can know to what extent we can conserve the water.

MR. J. T. HINKLE, of Oregon: I would like to ask Mr. Young about the conditions prior to the inauguration of this law, whether there were other rights besides those which were appropriated and how they were dealt with. My reason for asking this is that in my own state there are two classes, of water rights; those obtained by appropriation, and riparian rights, which were obtained by appropriating the land and the water being appurtenant to the land. Under that the water did not have to be used, but could be kept until it was desired to use it. I would like to know if there were any such rights in British Columbia and how they were treated?

MR. YOUNG: The riparian rights of owners have been recognized to the extent of the water owned for commercial purposes. Of course the common law of British Columbia was the common law of England. We have taken a stand, however, to bring the issue to a head, by stating that all riparian owners must, within two years, file a claim; after that they have no rights as riparian owners.

CHAIRMAN D. W. ROSS: Gentlemen: The time is rapidly advancing and I have no doubt that you would all be glad to go into the subject further, but under the circumstances we will have to proceed. I now take pleasure in introducing Mr. A. F. Mantle, Deputy Minister of Agriculture for the province of Saskatchewan, who will deliver an address on "Irrigation and Saskatchewan Agriculture", Mr. Mantle, gentlemen, (Applause).

Address by

A. F. Mantle

Deputy Minister of Agriculture for Saskatchewan

IRRIGATION AND SASKATCHEWAN AGRICULTURE

Mr. President, Ladies and Gentlemen:

I am not an irrigator or an irrigation specialist, and I shall only take up your time for a few minutes this morning simply to convey to this Congress the greetings of the Saskatchewan

Government and the Saskatchewan farmers in general. It is true that Saskatchewan has not, at the present time, many extensive irrigation projects, and probably it is true that it never will have; but it is also true that we are, like yourselves, vitally interested in the relations between water and agriculture.

Water is usually the limiting factor in our agricultural production. Either we have too little of it for profitable production, or else we do not take sufficiently good care of it, and thereby our yields are limited. On the other hand it sometimes happens that we have too much rain and the crops in those districts are apt to be overtaken by an early fall frost. So that the relation of water to crop production, whether it be artificially applied or by rain-fall, is a thing in which we are vitally interested, and therefore we have a sympathetic interest in this Congress of Irrigationists. We also have quite a number of small irrigation schemes in the southwest part of the province, to which possibly some reference has been made by some speaker representing the Dominion Government at this Congress.

The available water supply for irrigation purposes in Saskatchewan is either contained in the large rivers, such as the North and South Saskatchewan, which flow through the province, or else in the small prairie streams or creeks, which rise in our own water-sheds, and which traverse the province in a north-easterly or easterly direction. As far as our large rivers are concerned, those of you who are at all familiar with the general topography of Western Canada know that these large rivers have their rise on the eastern slope of the Rocky Mountains, consequently they have to cross the province of Alberta before they get to Saskatchewan. For the sake of those who did not look up their geography before they came here, I may say that Saskatchewan lies to the east of Alberta, the same as Utah lies to the east of Nevada. They are twin sisters, they have the same heritage and the same growth. Our large rivers then come to us across the province of Alberta and I am satisfied that you gentlemen from the States, who have been in this city for a couple of days, and who have possibly visited here before, and have experienced the warm welcome and the hearty hand-shake of the Albertans, will appreciate that when we get second whack at even these big rivers our chances of having extensive irrigation projects are very slim indeed! However, we are prepared to let it go at this—that Alberta needs the water and we are prepared to get along without it.

Apart from these big rivers, we have in the Cypress Hills country a considerable watershed at an elevation of some 2,000 feet to 4,000 feet, fairly well situated, and which forms the basis of supply for some 300 or more irrigation projects of

a small comparatively and inexpensive character. These projects, up to the present time, have mainly consisted of the application of spring freshets to natural hay growing on bottom land for the production of a supply of winter forage for range stock. What developments there may be in the future of these projects, along such lines as the application of water to the production of vegetables and cultivated grasses and so forth, remains to be seen. Doubtless that development will be considerable, but the development, so far as the production of vegetables and some classes of fruit are concerned, will necessarily be dependent on the development of markets in those areas. The projects are there and are increasing in number and usefulness. The class of construction entering into them has improved from year to year, and no doubt there is a centre of irrigation activity in the Cypress Hills country that will be a considerable factor in the development of the agriculture of southwestern Saskatchewan in the future.

Our position at the present moment is this, that, of 10,000,000 acres sown to crops last year, only 10,000 acres, as far as the statistics are available, were sown on irrigated land; so you will appreciate the fact that for the time being, at least, we are a province of dry-farmers, rather than a province of irrigators. That fact is the real reason why the Saskatchewan Government, or the Saskatchewan Department of Agriculture, is represented here to-day by myself instead of by my chief, the Honourable Mr. Motherwell, the Minister of Agriculture. The Minister of Agriculture has had a share for some years past in the management and working of the International Dry-Farming Congress, which as many of you are aware, meets in the state of Kansas next week, and on that account, and because our interest in dry-farming is so large, and our interest in irrigation, for the time being at least, so comparatively slight, he felt that it was his duty to go to Withita, Kansas and represent the province at the International Dry-Farming Congress, and so left to his assistant the pleasant task of representing the province at the Irrigation Congress.

I have no doubt that, as time goes by, the number and extent of the irrigation projects in the province of Saskatchewan will increase, but at the same time there are certain limiting factors which preclude the probability of us ever having such irrigation projects as surround this city—projects such as you will visit on Friday next. For one reason, as I have stated, I judge Alberta is ahead of us in the matter of receiving the water. Another reason is that the province of Saskatchewan has made application for reservation of 100 million gallons of water per day from the South Saskatchewan river for the domestic water supply of the cities and larger towns of southern Saskatchewan. We cannot have our cake and eat it, and we cannot drink our water and also apply it to

the land, so that our projects, as far as the South Saskatchewan river is concerned, will be for urban and domestic purposes, rather than supplying the land.

Another reason is that, even if we had the water, our large rivers flow through valleys that have high sides and our arable land is, in most cases, hundreds of feet above the level of the large streams. It may be that in certain localities that could be overcome. Perhaps the water could be pumped up to the land level, and perhaps in other places it could be diverted higher up stream. However, our natural rain-fall is such that by the application of proper methods of cultivation we can grow sufficiently large crops, and sufficiently profitable crops, that the obtaining of water for irrigation purposes, as far as the grain production is concerned, would probably not be an economical proposition, and sound from that standpoint.

In a year like this, we could very well have done with a liberal application of water, from whatever sources it came, on something like 2,000,000 acres of our crops, but happily that condition only obtains in a few localities each year, as a rule. This condition may not occur again for three or four years, and when it occurs again it will probably be in a much more local and limited area. We would be in the position of having made a large expenditure on an irrigation project, and then making no economic use of the water two years out of three. Irrigation is either a necessity or a luxury. In many regions it is a necessity, crops cannot be produced without it. In no part of Saskatchewan is it an actual necessity, valuable as its results are. Irrigation is sometimes a luxury. Water artificially supplied is used to supplement the natural supply of rain, which is sufficient for ordinary purposes, but the extra artificial application is used to enable the irrigator to obtain larger returns from expensive land. At present we have no expensive land. We are a pioneer province, devoted to pioneer agriculture, and until we have expensive land devoted to truck farming and so forth, it will not be possible to use irrigation, except as a luxury.

Before taking my seat I want to refer for one moment to the question that was raised in the course of the morning. This is the matter of taking to the individual farmer the information which our agricultural experiment stations and our agricultural colleges have become possessed of. The problem, undoubtedly on both sides of the line, is bothering the minds of those stimulating agricultural production, and I would like to outline to you what is being done in our province to-day along that line. It is generally recognized that the local self-governing unit has to be used. You use your counties or your municipalities. In Saskatchewan our unit is known as the rural municipality, and it is an area of land uniform in size throughout the province. We take eighteen miles square

and confer on that unit municipal powers. They raise their own levies and do all their own work. We have no larger administration unit till we come to the province.

We have already over 300 of these rural municipal units organized, and, by the time our land settlement is anything like complete, we will have probably 500 or 600. It is apparent that it would be hopeless for the Provincial Government to finance the placing in each of these districts of a trained expert to devote his entire time to improving farming methods in these districts. A little calculation will show that at the present moment the expenditure would run to probably half a million dollars a year. Then again the men are not available and do not begin to be available. We have our agricultural college, but that as yet is only a few years old, and the senior students are only in their third year, so that for many years to come the supply of college graduates, who have had practical and scientific training sufficient to be of assistance to the farmer, will be very small.

We are compromising to this extent. We are suggesting to rural municipalities that they take a successful farmer—preferably a young man who has made good in that district—and make an arrangement with him where by for two months, three months, ten or twelve months of the year, he will devote his time to working amongst his neighbours for the improvement of their methods, and we undertake, if the municipality will make that expenditure and appoint such a man, calling him their agricultural secretary, or whatever name they choose to bring him into the centres of educational work in the province, into the college of agriculture at Saskatoon or Regina, and there give him training for two weeks or so and so help him to be useful to his community.

The first year some sixty councils accepted the proposition and appointed a man for anywhere from three to twelve months, and instead of calling him a weed inspector, with police powers, he was called an agricultural secretary, and was given opportunities in the direction of stimulating production.

The expenditure made by the municipal councils themselves, by local taxation on that work, this year, on our province, is \$40,000. That is all supplementary to the expenditure which the Provincial Government makes on agricultural extension work through the college of agriculture. We keep in touch with these men through the medium of field representatives. We have five of these all the summer, and three all the winter. Each of these men keeps in touch with and helps these municipal officers in their work.

Now that is only a temporary expedient. We want men of the best training that can be had for this work ultimately. We feel though, it is better to have a good local man, paid by his municipality, to leave his own farm, and devote himself

to helping his neighbours in the community, than it is to have nothing at all being done in that line of personal work amongst the farmers of the province. That, of course, all supplements the regular lines of extension work, such as institute and agricultural society work and so forth. I thought Mr. Chairman that the Congress might just be interested in hearing how that particular problem was being met under our conditions, which are a much more scattered settlement—120,000 settlers scattered over a province 350 miles wide and something like 750 miles from north to south—and small, local, self-governing units, in which there is a comparatively sparse population, and in which it is impossible for the Provincial or the Dominion Government to put a county representative into each district.

It is these opportunities that we have in an international gathering, such as this—opportunities of getting together and comparing our problems and the solutions of each province or state—that it seems to me it is one of the great reasons why the condition obtains—which the Minister of Agriculture for Alberta referred to so splendidly on Monday night—the condition of an international boundary line of 4,000 miles, and no ill feeling anywhere along it! We have similar conditions north and south of the line, and we have a great similarity between the type of settlers on the north and south of the line, and the type of men who have been selected by the authorities to help out these settlers, and look after them, so that it is easy for us to get together in gatherings of this kind, with nothing but good-feeling and mutual good-will prevailing. It is such gatherings as this which will make it forever impossible or unnecessary to fortify a boundary line of this kind, and without the fortification we shall never have the excuse to quarrel. (Applause.)

CHAIRMAN ROSS: I am sure Mr. Mantle will be pleased to answer any questions.

MR. CAMPBELL, of British Columbia: What will be the average rain-fall for your districts where you do not require irrigation?

MR. MANTLE: From thirteen to sixteen inches, with a rate of evaporation which is not determined, but which we know from climatic conditions must be lower than the rate of evaporation in the states to the south.

MR. C. E. LAURENCE, of British Columbia: Are you getting good results from dry farming methods?

MR. MANTLE: I think that question can be answered unequivocally, yes. We are getting good results. If Dean Rutherford were in the audience he could give us the exact

figures and the results obtaining this year on the field of the college farm at Saskatoon, which had a rain-fall, from the time seeding commenced until the time threshing was completed of one and two-thirds inches, and on which the wheat threshed out twenty-five bushels to the acre on summer-fallow, and twelve fourteen bushels on fall ploughing. Those figures are approximately correct. That is on a farm which has been under cultivation for some years. It was under cultivation before the college got hold of it and of course it was handled simply according to the lines which every farmer, who has the ordinary machinery, can handle his land. That is about as little rain-fall as we hope to ever have to produce crops under.

MR. LAURENCE: May I ask a further question? Did you have a heavy snow-fall in the winter, and did you manage to conserve that for this year's crop?

MR. MANTLE: My answer is that we did not have a heavy snow-fall last winter in at least that part of the province, and in anycase we are apt to lose a good deal of the water resulting from a heavy snow-fall because the snow melts before the land is thawed out, and a good deal of it is run-off. An idea of the snow-fall at the Saskatoon Farm last winter can be obtained from the fact that eighty ewes fed all winter on a stubble field of seventy acres on nothing but what they could pick up around the straw piles. These ewes spent their nights in the stubble also and not in the stables. That kind of sheep husbandry would not have been possible if there had been a heavy snow-fall. That illustrates the fact, incidently, that for live stock production up in our dry and bright country it is not necessary to have a lot of expensive buildings, for those ewes in the spring time averaged a lamb and a half at lambing.

MR. W. J. THOMPSON, of Saskatchewan; With reference to the agricultural conditions over the province, for which the province is greatly indebted to the C. P. R., I would like to know if the result of that work of the Canadian Pacific Railway, if the carrying out of that work was done for the purpose of reaching the farmer on his own farm. I forget the number of farmers which you reach, but I know in my own district there were hundreds of farmers who would have been interested in that information. I, for one, did not get any of it because I could not cross the river. It seems to me it might be a good step in the evolution of that administration work that there should be some arrangement made between them and the railway companies. Let's get that information closer at home. I think that that step in the programme has been evolved.

MR. MANTLE: I think you could not have been in when I was addressing the Congress.

MR. THOMPSON: I understood from your address that you have sixty young men or farmers in connection with three hundred municipalities in the province.

MR. MANTLE: In connection with sixty.

MR. THOMPSON: Well, sixty out of three hundred for three or twelve months, as the case may be. I understand that these men are not necessarily specialists, but that they can give good information. There is a system there on the other side, and we can get a few good things from the Yankees. I believe it has been worked out on that side of the line, and I was wondering whether it was not a basis whereby we could work out something of the same kind on this side of the line.

MR. MANTLE: I tried to make it clear that the reason it could not be worked out on the same lines at the present time, in Saskatchewan is, that we have not got the experts, and again we have not the funds for the Provincial Government to put one such expert, were he available, into every one of the three hundred municipalities in the province, and we adopted the plan which I spoke of, the plan by which sixty municipalities co-operated with us last summer, as a compromise for the time being until we will have more experts and more money to put them out. Now we need not be scared of borrowing this idea from our American friends, even if it is a good one and even if it hurts our pride a little, because after all they borrowed the idea from Canada in the first place. If there is any one here from Ontario they will bear me out in the statement that the first district representatives that were appointed on this continent were appointed by the government of the province of Ontario, which has to-day upwards of eighty such young men operating, two to a county, in forty of the counties of that very progressive province along the line of agricultural education. We do not need to have any ill feeling as to where we get a good idea from. The thing is, in the first place, to have the men, and to have the money, in the second place, with which to pay those men, and, until we have more men and more money, to use the best means we have at hand for doing this important work of getting into individual and personal touch with the men on the land.

CHAIRMAN ROSS: I take pleasure in introducing Mr. D. W. Hays, who will speak of "The Relation of the Farmer to the Irrigation Project." Mr. Hays, gentlemen. (Applause).

Address by

D. W. Hays

Chief Engineer Southern Alberta Land Company

THE RELATION OF THE FARMER TO THE IRRIGATION PROJECT

Mr. Chairman, Ladies and Gentlemen:

When I was asked about ten days ago to choose a subject to come before this Congress, I made the choice of the subject which I entitled, "The Relation of the Farmer to the Irrigation Project." I find that probably I could not have bitten off a larger mouthful. That subject involves every phase of irrigation work. I shall attempt in my paper to point out only a few of the phases or conditions which affect the farmer in the relation of certain payments which he makes to the irrigation projects for water rights.

In the operation of large irrigation projects during the past ten years, a disturbing condition of affairs has manifested itself in the fact that irrigation development was not as rapid as it was expected to be. Following the lead taken in the construction of large works by the U. S. Reclamation Service, numerous other projects were started by private land owning companies, or by private capital, who undertook the construction of irrigation works under the provisions of the Carey Act. Many of these enterprises have been passing through a stage of depression, until at the present time there is difficulty in disposing of irrigation securities and in financing legitimate and worthy irrigation enterprises. Investors and all interested have naturally looked for the sources of trouble causing this depression, and in their research and general study of the conditions have brought forth two general classifications of the trouble.

The first and most readily ascertained was a physical condition of affairs which proclaimed a general ignorance, so far as hydraulic and civil engineering related to the problem of supplying a reliable and proper distribution of water to the necessary requirements of growing crops, and in which it was found that the financing for the construction and operation of irrigation works had been much under-estimated, and that many fundamental principles, now seen to be essential to the operation and maintenance of the works, were then little appreciated. It was also found that proper steps had not always been taken to secure legal rights to the use of water, provided even if such rights could have then been determined in the complexity of state laws. Moreover, little general knowledge could be obtained as to the supply of water from natural sources, and gross errors were made as to the quan-

tities that might be made serviceable. Upon these conditions becoming apparent, a determined effort was made to rectify matters, from which developed the irrigation engineer with a new and broader view of matters pertaining to irrigation work, and there resulted an activity by the states to enact laws, define and measure existing water right claims, and provide for future appropriation. These adjustments are taking time, and in their gradual growth out of confusion there exists to-day a knowledge of conditions that leaves little excuse for entering unprepared upon the development of irrigation works as to its physical aspects.

The purpose for which the irrigation project was built remains to be realized, and in the fulfilment of that purpose the second and real cause of trouble is found. It was not a physical trouble, but one that essentially must be overcome. It has to do with the procedure by which those people who were to settle upon the land could get from the soil the returns necessary to bring success and comfort to themselves, and be enabled to return in money payments the values of services rendered to them in the supply and use of water from the constructed irrigated system.

From the point of view of the irrigation company, this is the most serious problem which it has had to contend to-day. It is to a large degree intangible to the irrigation company, but must be finally overcome along slow and tedious educational lines, both to the land occupant and itself.

The object of the *farmer* is to make money, or to indirectly bring to himself and family its equivalent in the necessities and comforts of a home. The object of the *irrigation company* is to make money or indirectly to produce its equivalent in the prosperity and development of a district, state or nation.

The existing financial conditions which confront the farmer on his irrigated farm, usually called his "farm unit," and that confront the irrigation company on its irrigated farm, usually called "irrigation project" are in many respects one and the same.

The small farm is a component part of the larger, as much so as the farmer may consider an acre plot of garden or a five acre tract of cow pasture a necessary adjunct to the entire farm unit. The successful operation of each of these individual parts of the farm unit are factors in the development of the farm unit as a whole, and the success of the farmer. So, too, is the success of each farm unit, by the various operations conducted thereon, a factor in the development of the irrigation project and the success of the irrigation company. In these desired attainments the success of the farmer is the *absolute basis and foundation* of the success and development of the irrigation project.

A multitude of obstacles stand to defeat the accomplishment of this, and each and every obstacle directly or indirectly affects the farmer, and by his relation to the irrigation project so does each obstacle affect the irrigation company.

It is the business at this date, on every irrigation project, of the farmer and agriculturalist on the one hand, and the engineer, the irrigation manager and the promoter on the other hand, to analyze these various problems as they may come within the province of either the farmer or the irrigation company, classify the losses, place responsibility, and by gradual process of elimination weed out the various features that are now a burden to this highest type of natural development.

Difficulties are found of great variety and character, and occur in every phase of the working of the enterprise, from the cultivation of the land, growing and marketing crops on the individual farm, throughout the operation of the project, its maintenance, its general management, and even to the initial construction of the irrigation works. Throughout the diversity of all of these the ultimate result of every obstacle has its equivalent in dollars and cents to the farmer and to the irrigation company. Many of these difficulties are without the province of the man who has settled upon the farm. This paper, however, relates largely to the farmer in his relation to the irrigation project, and in that respect we find the important feature contributing to the hardships and failures of farmers in the largest irrigation projects is, very naturally, insufficient finances during the first few years of operation.

For the possible reason that the farmer, when finding himself confronted with the shortage of money, resorts to the foundation of his initial undertaking, or possibly it may be a trait of human nature, or whatever other reason may be attributed, he goes back to his contract or agreement by which he was first invested with the responsibilities and obligations that are to him the source of his difficulties. The result is he appeals for help to the powers in control of the irrigation works with which he has placed his future prosperity. The result has been a general demand by the farmer for a partial relief in the payment of land and water right charges to thereby enable them to have more money for the development of their property.

Under the provisions of the Reclamation Act in the United States, it was required that the payment for water right charges should be made in *ten equal annual* instalments. Two years' grace was allowed before deferred payments would become delinquent and subject to cancellation. As a rule this general policy was followed with slight modifications by other irrigation works. These requirements for payment appeared too severe upon the farmer during the first years of his settle-

ment upon the land. In consequence, relief was asked for, to apply in the way of a graduated scale of payments, and an extension of the number of years in which the payments are to be made.

Realizing that there were hardships and privations during the first few years of development, these concessions have been made by both government and private irrigation projects. We now find that the land and water right charges are fixed on a term extending to fifteen or even twenty years, with a graduated scale of payments having a minimum charge during the first few years of operation and increasing to a maximum during later years, when the farm would easily be able to bear the burden of the higher charges. These adjustments have been made usually under the condition that a certain amount of development work should be conducted by the farmer during the first few years. It is needless to say that this system of regulative measures has been a great aid to the new settler.

Notwithstanding, however, what has been done in this regard, there is now a strong sentiment to influence further aid from the government or state by the construction of farm buildings and other improvements on the farm, or by cash loans—these services to be paid for during a long term of years and at low rate of interest. Such a policy, I understand, from reports on the subject, is now being carried out in the Australian provinces, and extends to the building of houses, fencing the property and grading and seeding a fourth of the settlers' holdings. In addition, the Australian provinces give aid in the way of equipment, loaning to the settler implements of all kinds at a small charge. They also furnish cows or horses—the settler paying a deposit or giving security. The settler is given thirty-one and one-half years to pay for his land and water right charges, interest on the land being at $4\frac{1}{2}\%$, and upon water right charges a price is fixed to provide 4% interest on the cost of the works, besides expenses of operation and maintenance.

This policy is a broad and constructive one from the point of view of a government or state, whose best assets are the development of the land and the construction of homes and valuable property, and the maintenance of prosperity.

However constructive a policy such as described may be from its aspects of political economy of the government, there must follow some adjustment in the encouragement offered to the farmer and the encouragement that is to be offered to the capitalist and landholders who have ventured their property and money into irrigation enterprises.

There are at the present time possibly one hundred irrigation projects in the western states now in operation, exclusive of the twenty or more projects under the Reclamation Service.

These projects vary to some extent as to the present degree of development and as to their future valuation from an agricultural standpoint. The policy of government or state aid to the farmer could not be justly applied, only to such projects as may be conducted by the government or under the auspices of state control. A liberal view on the political economy of such a procedure would require that equal aid should extend to farm holdings situated on all irrigation undertakings that are of merit, either government or private.



TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS, CALGARY, 1914.

A scheme of such generous features would certainly attract that class of people who think the world owes them a living, and who are indolent and unworthy. The government or state, under such a policy, must become responsible to the private irrigation companies for all obligations entered into by the settlers.

The consummation of such a plan would entail many difficulties.

There must be some discretion exercised to classify by a multitude of conditions the good, medium and bad from the point of view of physical conditions involving construction, water resources and methods of financing and from its agricultural possibilities, and not least of all the relation that the

land occupant would bear to the project under the respective control of the several named sources of organization and development.

There have been many lessons taught in the past ten years with regard to irrigation as a whole. Federal and state laws have been formulated without number, and new ones are still being suggested, all of which bear directly on the object to be reached, namely the prosperity of the land holder. It is with the landholder that all must deal, and for which government and state legislate with more or less indifferent success. Whatever form these legislators' enactments may take, there will still remain those things which lie only within the province of the farmer and the local management and operations of individual projects that must be taken care of within themselves.

The majority of settlers are men of moderate means, and frequently not versed in good business methods affecting their own success. The difficulties and deficits in finances may be largely contributed to two things.

(1) Ignorance as to what it costs to enter upon a tract of land and develop that land into a paying farm.

(2) Inherent greed of man to want more than he can use.

Depending possibly upon their past environment, each pictures a farm and home perfected to a certain standard of development. In their enthusiasm to attain this development they attempt too much during the first years.

The other case is of the man who wants or gets more than he can handle in order to speculate. He wishes to secure for his own profit on as large an area as he can get, the enhanced value of land with water rights, and the unearned increment created by the development of property around him.

Cases can be given in great numbers where the fundamental blunder is made in acquiring too much land. The settler rarely has sufficient money to improve all of his property at the outset and get it into productive shape. He will attempt this, however, by the usual procedure of scattered efforts over a large portion or the whole area. In the meantime, payments must be made for land and water rights. Three out of five shortly find themselves overburdened by these payments and by their necessary living expenses, and that they have very little money left to develop their property. The larger the tract of land, the more keenly this situation affects the settler. An appeal is made to the holding company for relief from payments, with a willingness to pay interest, which only adds one more burden. If relief is not granted the farmer considers himself unduly handicapped in entering upon further developments. He is disgruntled and discouraged, and with resources curtailed does not or cannot take care of whatever work was commenced, and the entire holdings deteriorate.

If relief is granted, the irrigation company trusts to the farmer's integrity and ability to properly use the money for the development of the land. If the farmer is the right type of man, and the property is not in too bad shape, the assistance may be worthy. Frequently, however, the respite granted, may stimulate only, as wine stimulates an exhausted man. It is difficult to discriminate between cases which are worthy and those which are not.

If, on the other hand, the farmer had first entered upon a small tract of land with relatively less payments for land and water rights, there would have been a certain surplus left over and saved to him, which might otherwise have gone into a capital expenditure. If, together with money intended for crops, a part of this surplus is used in putting in a garden, ten acres of land for a first class forage crop, and for the purchase of some livestock, a large part of living expense is covered. Some money is left over, and with the foundation established, the farmer is assisted each year in getting five or ten acres additional land into productive shape..

No better proof of this could be furnished than by reference to the improved areas of productive farms in the western states.

From the records of the last census taken in the United States, a table has been compiled by the United States Reclamation Service showing the average improved acreage for farms of 175 acres in size. This information was taken from the records in forty-three counties in eleven western states where irrigation is practised. From the data I quote that, for over fifty per cent. (50%) of the forty-three counties, the average improved acreage is less than forty acres. In eighty per cent. (80%) of the counties it is less than sixty acres.

The history of these conditions has demonstrated the advisability, or even necessity, of the land on irrigation projects being divided into small farm units. The area must be limited to ensure success both to the farmer and to the project.

There is now a demand for small farm units on the part of the farmers who have seen the fallacy of the large farm, and we find on every hand successful and prosperous farmers who have confined themselves to the tillage of small areas.

From past conditions it is demonstrated that the difficulties on the irrigation project lie directly with the financial requirements of the farmers. Whatever may have been the cost of constructed works or the cost of operation and maintenance, or expenses incidental to settlement—all of these must be paid for ultimately, through the instalments paid by the farmer to the company. Each of these various items of expense made during the construction or development period must bear interest to the company until such time as the holdings and work have been paid for. The payments of the

farmer, of these various charges, has a direct bearing in some degree on the profits which he is to obtain from his farming activities.

We point to the usual desire of the man starting a farm,—that he endeavours to improve too much property at the outset, and criticise him for not having placed his energies and capital on a smaller area. We blame the farmer, and rightly so, for taking a capital of, say, \$5,000, if he is fortunate enough to have that amount, and with it purchasing 160 acres of land, or at least making a partial payment on that area, knowing that he has other payments coming due, and that these payments are bearing interest. The same criticism would apply to the construction of the irrigation system. It is doubtful if there is a single large irrigation project at the present time that is not to some extent over constructed. Each unnecessary dollar placed in the construction of the works is an outlay on which an interest charge must be paid—this charge finally being paid by the farmer. A just criticism can be made that the construction works should follow more equally the requirements of the project, based upon its development from an irrigation and agricultural standpoint. In planning the works, due consideration should be given to its ultimate requirements, but it is quite possible to build certain parts of the works to a partial capacity, or even of a temporary character, which will adequately serve the needs of irrigation during the earlier stages of the project's development.

The interest of the settler extends also to the cost of operation and management. For any large scheme, it is necessary that a fairly well organized operation and maintenance force be established at the beginning. The operation of the system will require nearly as much attention whether that system is carrying water to supply ten farmers or one hundred. It is very obvious that the expenditures for this operation must greatly exceed the revenue that is returned in operation and maintenance charges. This deficit must therefore be made up as a part of the construction charge or making the operation and maintenance charge per acre sufficiently high so that the deficit may be recovered in later years. So far as the company is concerned, these deficits are a cash outlay which must bear interest. The interest alone on the deficit during the earlier stages of project development will nearly double the cost for operation and maintenance.

The cost of settlement very frequently runs into large figures, particularly so on private irrigation projects. It is the natural desire of the investors who have furnished the capital for the construction to want returns at as early a date as possible. This has resulted in very large expenditures in advertising and settlement campaigns. Each year's delay in

getting settlers started upon the land means a loss of between one-tenth to one-twentieth of the value of the entire irrigation project. Time means interest, and interest may soon double the cost to the farmer. Unfortunately the disposal of the lands are sometimes placed in the hands of that type of real estate agent, whose main object, possibly, is to get some fee or commission out of the first payments, regardless of the ability or finances of the prospective settlers, and leave the future to take care of itself. The project may be severely handicapped, however successful it may have been in getting settlers on the land, for no other reason than that those first coming may not be thorough farmers, they are in new surroundings and find conditions hard. The result is that the settler becomes dissatisfied and discouraged, and will turn away nearly every newcomer who appears.

The first individuals who locate should be carefully chosen with respect to their farming and financial ability to conduct successful farms. While this may result in a delay at the commencement, there is great assistance rendered by the results obtained by a few successful farmers. One successful and satisfied farmer is more advertisement to the irrigation project than ten advertising and settlement agents, and will produce results at a comparatively small cost instead of a large one.

In an article published in one of the leading engineering journals during this year, with respect to the expenditures on a new irrigated farm, the author classifies those expenditures under these general headings which I quote as follows:—

Initial Expenses	\$ 835.00
Family Living Expenses—first year	847.00
Farm Expenses, 1 year (no depreciation allowed)	330.00
Farm Plant and Equipment	1,286.00
Farm Stock and Farm Machinery	1,796.00
Seed for the entire Ranch, and extra labour first year....	480.00

Grand total at the end of the first year.....\$5,574.00

Under the item of Initial Expenses amounting to \$835.00, there is included the item of First Payment of 10% on a \$40.00 per acre construction charge—amounting to \$320.00. This is the only item of expense in the entire list incidental to water right, there being no charge for land. I am of the opinion that some of the expenses may be unnecessarily high for the first year of development, and might more properly fit to the requirements of the farm unit when a large proportion of it was under cultivation. As against these figures the author goes on to show in some detail the returns that may come from this investment, and shows that for developed property, including buildings, fences, equipment, stock and farm improvements including interest, the irrigated farm

represents about \$100.00 of investment per acre, and that investment can offer \$26.10 per year per acre net profit, or approximately 26% on the investment made.

Referring to the items of expenditures listed, we find that \$320.00 only out of the total amount of \$5,574.00 is expended for water right charges. This represents only $5\frac{7}{10}\%$ of the gross expenditures. Notwithstanding this small percentage of water right charge of $5\frac{7}{10}\%$ of the whole expenditures, the article concludes with a statement which I quote as follows:—

“The utter inadequacy of merely changing the ten year payments for irrigation construction charges to twenty year payments, or even thirty year payments, on government projects should be appreciated. Prior levelling of the land or immediate loaning of \$500.00 to the settler for every ten acres levelled and seeded is worth considering. If the Reclamation Service can get adequate help for the settler, its irrigation work probably has the most brilliant future before it of any branch of engineering.”

The title of the article from which this information has been taken is “The Answer to, what is the matter with Irrigation?”

This is one character of criticism which the private irrigation company must face at this date, and in which it would appear that the burden and responsibility of the farmer throughout all his difficulties, all of which are well realized, have been credited to the charges for water right. (Applause).

CHAIRMAN ROSS: Gentlemen, the time is advancing. It is now past the hour that we should have concluded the morning session, but you have no one to blame for this but yourselves respectively. Mr. Hays' paper goes to the very foundation of many matters of great importance to many of you, and if you have any questions to ask now is the time to ask them, and we can probably well afford to squeeze in a few minutes for the purpose of discussing this very important paper. (No response.)

CHAIRMAN ROSS: Mr. Dennis desires to make some announcements.

MR. DENNIS: The Superintendent of the City Street Railway desires me to say to you that he has provided the City Sight Seeing Car, which will be at the Palliser Hotel corner Ninth Avenue and First Street West, leaving there sharp at 2.15, o'clock, the idea being that he will give you fifteen or twenty minutes trip over the city and deliver you here at 2.30 or shortly after. It is a large car and the Superintendent will appreciate it, if all the delegates and their wives will go on that trip with him.

The Calgary Ad Club are having a luncheon at the Palliser Hotel at 12.30 o'clock, with a small moving picture exhibition, and they extend an invitation to the delegates and others to be present.

CHAIRMAN ROSS: The Secretary has some announcements to make.

SECRETARY HOOKER: The following are the nominations for the different state and provincial committees;

(The lists of committeemen read by the Secretary will be found with the respective committee reports. The state delegation Chairmen, Secretaries, Executive Committeemen and Honorary Vice-presidents will be found in the Appendix to this volume.)

At this point the Congress adjourned until 2:30 o'clock P.M., October 7, 1914.

SEVENTH SESSION

WEDNESDAY, OCTOBER 7, 1914

2.30 o'clock p. m.

The Congress was called to order by President Young.

PRESIDENT YOUNG: I am requested to announce that all railway tickets have been validated and may be procured at the office below this platform.

My attention is directed to the programme for Thursday afternoon, which provides, after the report of the Resolutions Committee and discussions on that report, for the Call of the States and Provinces, under which Call there will be five minutes allotted to talks by the representatives of state delegations and each state or province that desires to be heard on that occasion should appoint some person to represent the state or the province.

The first item on this afternoon's programme is an address by Mr. Robert S. Stockton, of the province of Alberta, who is the Superintendent of Operation and Maintenance of the Department of Natural Resources of the Canadian Pacific Railway Company, on "Irrigation in Alberta and the Settler on Irrigated Land." I have the pleasure of introducing Mr. Stockton. (Applause).

Address by

Robert S. Stockton

Superintendent of Operation and Maintenance, Department of
Natural Resources, Canadian Pacific Railway Company

IRRIGATION IN ALBERTA AND THE SETTLER ON IRRIGATED LAND

Mr. President, Delegates, Ladies and Gentlemen:

It has been suggested by the Chairman, and I was going to make the suggestion myself, that those in the back part of the room come forward to the front seats.

I am glad to see here some local people because I have written a paper which I hope will be of some interest to those people. I have called the paper "Irrigation in Alberta and the Settler on Irrigated Land."

PROBLEM OF DEVELOPMENT

The promoters and business men most vitally interested in any western community, where irrigation is the basis of prosperity, can see in imagination the countryside developed into small intensively cultivated and scientifically irrigated farms, with neat cottages and barns, surrounded by trees and gardens and occupied by a contented, prosperous people, owning their homes and proud of their district.

There are a few such communities, and a few such places in all but the very newest irrigation districts, and these point the way and give hope for the future, but it is a well-known fact that one of the largest problems confronting many new irrigation districts is, in extending this desirable state of settlement and development to cover large areas of sage brush, prairie and stump land, for which water has been provided at great expense and for which the right kind of settlers are still to be found.

NEW SETTLERS

The new settlers on irrigated lands are often entirely ignorant of the practice of irrigation, and in many cases are not even experienced farmers, hence, where they are not located immediately adjacent to profitably irrigated farms, they require a long period of painful experience before approximating the desired success.

The Department of Natural Resources of the Canadian Pacific Railway Company is trying to shorten the period of experimenting for the newcomer by various means, among which the most important are: the colonizing on the land of small settlements of experienced irrigation farmers, the hiring of experienced ditchmen familiar with irrigation and competent to help the settlers, using water on grain, forage crops, trees and gardens at various headquarters of the operation and maintenance department, the conduct of demonstration farms and the introduction of dairy and beef stock. In addition to this field work there is a constant stream of printed matter in newspapers, pamphlets and circulars which aim to educate the settler in the methods and requirements of irrigation.

MIXED FARMING

Our slogan might read "Stock raising with diversified farming and irrigation without waste to obtain maximum yields and a greater variety of crops."

The science of agriculture, including the principles of irrigation and methods of conserving moisture, is being studied now as never before. The results from the work of

the Government Agricultural Department and the agricultural colleges are spreading widely, producing a wonderful advance in the profits and standing of the farmer. Business men and communities as a whole, as well as the irrigation companies and government are realizing more forcibly than ever, that the success of the farmers is the basis of the most enduring prosperity of the community, state, or nation and that there is a science of agriculture, the appreciation of the principles of which will, with reasonable industry, bring profits and success to the farmer. This is why in many districts bankers and business men are now willing to advance money to buy dairy cows and stock or finance the farmer who can show his ability to get results. This is why the Canadian Pacific Railway Company is shipping in dairy cows and other stock and selling them to farmers at cost and on credit.

IRRIGATION

Under what system of farming is it possible to get the highest yields with the greatest certainty and have the greatest variety of crops, in almost any country? The answer is *Irrigation Farming*. Under this system, when the moisture supplied to the crops by rain is deficient, it can be supplemented by irrigation. In a very small way heat and light can also be supplied artificially, but this is too expensive except for hothouses and small areas close to cities and devoted to high priced crops.

ALFALFA

If irrigation farming represents the highest type of farming then let us say further that, aside from special crops such as fruit and melons, alfalfa is the basis of crop rotation and exemplifies to the highest degree the benefits of irrigation. An irrigated farm with a rotation in which alfalfa is the principal crop and with stock on the place to consume the alfalfa will, with proper attention to details and methods, ensure the owner that his farming will be profitable and if the farmer is making money, everyone else is apt to be reasonably prosperous. Our duty to our settlers and our selfish interests then lead us to make every effort to educate and enthuse the farmer in his own business, show him the way to success and help to provide markets for his products.

METHODS OF IRRIGATION

GENERAL PRINCIPLES

In order to assist settlers on irrigated lands in Western Canada, a brief statement of the methods and principles of irrigation farming under our conditions is made. A proper appreciation of these general principles will enable the water user to avoid many expensive mistakes and, from the first secure some of the advantages of irrigation.

METHODS OF IRRIGATION

The principal methods of irrigation may be classified under five headings, as follows:—

1. Wild flooding,
2. Flooding from field ditches,
3. Flooding within borders,
4. Furrow Irrigation,
5. Check Irrigation.

The method selected in any given case depends on the topography, soil, crop and value of the land, and also to a large extent on the general practice of the district and the nature of the water right. The irrigator should devote considerable study to determining the system best adapted to his conditions and not blindly follow the practice of the district or the methods learned in some other locality. Sub-irrigation by seepage is practised to a limited extent, but cannot be used profitably except in rare cases where conditions are just right. Irrigation by sprinkling is confined to lawns and gardens under expensive piped systems for distributing the water.

WILD FLOODING

In the wild flooding method, the water is turned over the fields and run down the slopes and depressions in an unconfined and usually irregular stream. Ditches are used to convey the water to the high points but little or no work is done in spreading the water and the waste is very large. This method is practically confined to native hay and timothy meadows in the mountain districts where the water does not have to be conserved and where the lack of alkali, and good drainage slopes make it very difficult to spoil the land with excess water. While this is a very wasteful method of irrigation it is also very cheap and in certain districts is applied to large areas.

FLOOD IRRIGATION

In the flooding method of irrigation, water is carried in ditches on the ridges and along the slopes in such a way as to divide the field into lands or strips, usually about 50 to 200 feet wide. The ground is irrigated by diverting water from these ditches at fairly close intervals and allowing it to spread in a sheet down to the bottom of the valley or to the next ditch along the slope. The irrigator changes the dams when necessary and leads the water from each point of diversion as evenly as possible to the end of the run.

A skilful irrigator will, if the ground is well prepared, cover the lands quite evenly with practically no waste of water and at a moderate expense. This method is adapted to general farming with large fields of grain and hay and

may be used on land poorly prepared, although the results on smoothed and well-graded land are very much better. Flood irrigation may be used on slopes varying from 10 to 500 feet per mile, but it is easier to apply on moderate slopes, and requires a head of from one to two or more second feet of water, for each field ditch. The head depends on the soil, slopes, crop, skill of the irrigator and smoothness of the land. Where the field is properly prepared one man can often handle two heads of water and irrigate eight to twelve acres per day.

BORDER IRRIGATION

In the border method of irrigation, the water is run in a sheet down the slope and confined by bordering dykes on each side. The land must be levelled between the dykes at all points, transversely to the direction of the slope. The borders are generally arranged for the use of large heads of from ten to fifteen second feet. The work required to irrigate is small, but care must be exercised to cut the water into a new border at just the right time or there will be a large waste of water. This method should not be used unless the fields can be properly graded and the length of the run must be made such, that with the given conditions of soil, slope, crop, and depth of water, the irrigation will be even from top to bottom and no waste water be necessary. This method may be more economical than flood irrigation for general field crops when fairly even and moderate slopes occur and the water can be had in large heads.

FURROW IRRIGATION

In the furrow method of irrigation small furrows or corrugations are made in the direction of slope and connecting with a head ditch supplying water. Usually a number of furrows are carrying water at once and their length and size depend upon the soil, slope and amount of water required. The length should be such that for the given carrying capacity both ends will be irrigated alike and to the proper depth, and is ordinarily between 330 and 660 feet.

This method is necessary for plants grown in rows and cultivated, such as potatoes, beets, corn, etc., and is generally used in the irrigation of orchards and small fruits. In some districts, furrow irrigation is used for alfalfa and small grain and is one of the most economical and satisfactory methods where the land has been properly graded and prepared; it also has the advantage of not having requirement for a large head of water.

The furrow system of irrigation is the best general system for sloping lands, but requires a considerably larger first investment in grading and ditching. By using spouts to

deliver water to each furrow, the time required to irrigate can be estimated closely and no waste of water need occur.

CHECK IRRIGATION

In the check method of irrigation, the fields are divided into a series of level or nearly level plots or checks, surrounded by dykes just high enough to safely retain the desired depth of water for an irrigation and smooth enough to be travelled over with farm machinery. Water is conveyed to the checks through supply ditches and in some cases is carried directly from one check to the next. This is the most practical and most economical method for very flat lands, but is not adapted to land with slope enough for the other methods on account of the cost of grading the land. The checks may be made in squares or as strips between contour dykes and divided at intervals by cross dykes or supply ditches. The checks are usually made about as large as the topography or crop and field boundaries permit, but must not be too large to be filled with the available head of water in a reasonable length of time. While it requires usually a relatively large expenditure to prepare the checks, the irrigation is very uniform and there is no waste water.

PREPARATION OF LAND FOR IRRIGATION

GENERAL LAY-OUT

The first matter to be considered is the method of irrigation to be employed and the general lay-out of ditches to serve the land. This is a matter which affects the profits most vitally and should be carefully studied. The ditch system must carry water to the high points, whatever system is used and the location of the ditches will determine to some extent the boundaries of fields. A certain amount of engineering work may be required, particularly if there are cuts, fills and flumes required in construction of the ditches. In many cases the ditch can be located by the farmer with the aid of a carpenter's level, attached to a straight-edge or on a triangle, or a cheap farm level, as made by several instrument makers, can be used. It pays to do a certain amount of extra work to carry ditches along the fence lines and in straight lines so as to facilitate farming operations and not waste any land. The head ditches should have a grade of at least 0.05% and with such a grade must be larger than necessary where it is possible to get a fall of 0.1 feet or more in 100 feet.

The maximum grade that can be used without soil erosion will depend on the character of the soil and quantity of water run, but with steep hillsides it is necessary to provide flumes or drops, to carry the water down.

Aside from cuts and fills, the field ditches can be made in one operation by the use of a regular ditching plough, but are usually made by ploughing about twice each way along the line of the ditch and pushing the earth out with a home-made V or go-devil. The ditches should be plenty big enough to carry the desired head of water. Beginners, especially in using flood irrigation, are prone to make such small field ditches as to preclude good work.

WASTE-WATER DITCHES

The lower end of the farm, except possibly where it has been prepared for check irrigation, should be protected by a waste water ditch leading if possible to a natural drainage channel or a drainage ditch. Where there is no drainage outlet at all from the land, the ditch should lead to a small reservoir or check at the lowest point. It is not considered necessary to waste water in order to properly irrigate the land, but delays or accidents of various sorts are always happening and the judgment of the irrigator is often at fault, so that even with good intentions, some water will get away and unless preparation is made to care for it, water will flood the roads or some neighbour's lands, or both. Where the irrigator is careless and indifferent there will occur large losses through waste water, which is against the law, and usually spoils more or less land by water-logging or bringing up alkali. It is very desirable that stringent regulations against wasting water be enforced as a protection to the community.

GRADING AND SMOOTHING

The grading work necessary or desirable depends, as has been pointed out, on the topography and the method of irrigation to be used. If the land is at all rough, the work after clearing of brush if necessary consists of grading down such knolls as can profitably be moved and filling depressions, especially those which would retain water. This work can usually be most economically done with a Fresno scraper, but other grading tools are used. For all except check irrigation, the idea is to get continuous slopes from ridge to valley, but the degree of the slope may vary. It should be noted that it is usually better to grade a small area each year to a high degree of excellence than to try and cover too large an area. This is especially true where it is desired to seed down to a more or less permanent crop such as alfalfa or fruit, or irrigate by the furrow system. Land in small grain can be improved from year to year. Grading work cannot be undertaken without considering the sub-soil. If the sub-soil is gravel or stone it may preclude grading, but if it is of sand or clay, considerable grading may be done by trenching through the knolls and levelling across the

trenches so as to mix the top soil with the sub-soil, which must also be built up with the addition of manure or a green crop ploughed under.

A road grader may be used to advantage in smoothing the land, but is ordinarily not available. The final smoothing is usually carried out with some form of home-made leveller. The best type is made of 2" x 10" plank, 16 to 20 feet long and with three cross planks, the centre one being fixed on a lever so as to be raised and lowered and used as a cutting edge. The width of the leveller is from five to eight feet, depending on the number of horses available. There should be at least four horses. Levellers with a fixed centre cutting edge are much used, but are not so effective, especially in preparing new fields. The leveller is used each time a crop is put in as it has been found to save enough time in irrigating to justify its use. If the soil is light and tends to blow away, the field must be harrowed or drilled as soon as smoothed with the leveller in order to ridge the soil and prevent its blowing, as far as possible. With very light and sandy soils exposed to high winds, it is inadvisable to break and prepare large fields as it may then be very difficult to keep seed in the ground. It is suggested that in such cases the land be prepared as far as possible in strips, alternating with the unbroken prairie, and when the first strips are in crop, the remaining land can be broken, but on such soils a portion of the land should always be in alfalfa or some covering crop and tree wind breaks planted as soon as possible. The addition of manure and straw or a green crop ploughed under will greatly improve light sandy soils.

SOILS AND CROPS

SOIL

The soil overlaying the country rock may have been formed from the gradual breaking down of these rocks in place or by the deposit of other material carried by water, ice, or wind.

The soils on the eastern slopes of the Rocky Mountains are formed largely by erosion of the mountains and from clay shales and sandstones underlying the country. The soil is roughly divided into top-soil and sub-soil, the top-soil being distinguished by containing a certain portion of vegetable and animal matter called humus. Up to a certain point, the more humus the soil contains the more fertile it is and some humus is necessary for profitable growth. The top-soils in Alberta are rich in humus compared with some semi-arid regions and are well supplied with potassium, calcium, magnesium, and sodium salts, which is a characteristic of arid or semi-arid soils that are not subjected to the leaching that occurs in a humid region.

Soils may be classed as clay soils, sandy soils, and limestone soils, but are very seldom found pure, and are named from the predominating constituents. When a soil is well mixed and contains humus it is called a loam, if sand predominates, it becomes a sandy loam. A soil with a large percentage of lime is called a marl. The decomposition of nearly all rocks, except sandstone and limestone, results in a clay soil, that is, a soil containing silicate of alumina as the principal constituent. It is important to have a proper total and relative amount of vegetable matter, nitrates, phosphates, potash and lime in order to have a soil of great productiveness. A soil analysis, therefore, in certain cases is an important matter, since if one of the essentials is absent or present in very small amounts, it may be feasible and profitable to supply the deficiency.

Most western soils in the arid or semi-arid belt contain more or less soluble alkalis, which, when not present to excess, furnish some plant food, but when concentrated at certain points may become strong enough to prevent any profitable plant growth. The alkalis are represented by various salts of calcium, sodium, potassium, and magnesium, and are generally brought into the surface soil by water seeping from underground sources and evaporating on the surface, leaving the alkali as a crust on or near the surface.

In order to get rid of alkali it is necessary to reverse this process by providing drainage and then supplying an excess of water to wash off the surface deposit or carry it down to the drainage outlet. This has been tried and it has been shown that any alkali land can be reclaimed if a drainage outlet can be had and water is available for flooding, so it comes down merely to a question of expense.

This matter is a very important one in most irrigated districts because seepage water from ditches and from over-irrigation of the land may be thrown to the surface by underground impervious strata. This seepage water dissolves the alkali from the soil and rock through which it passes and by evaporation deposits it as mentioned above, which makes clear the importance of supplying by irrigation only enough water to furnish the needed moisture for growing crops. An understanding of this matter will often enable the farmer by a simple system of ditches to cut off the seepage water and thus prevent the damage, or by constructing an outlet drain which will allow the land to be flooded heavily and the excess alkali washed downward. Check irrigation is particularly adapted to reclaiming alkali land or stopping the rise of alkali, as it enables the land owner to make a heavy irrigation and force the circulation downwards. A heavy forage crop which prevents surface evaporation is of great assistance in this matter of keeping the alkali down.

The handling of the alkali problem demands co-operation, since one farm on high ground may have such sub-soil conditions that no amount of irrigation water will bring up any alkali, but excessive use may spoil one or more farms adjacent or even at some distance away.

It is said that irrigation leaches out some of the valuable constituents of the soil and so it does, but it was recently determined at the Utah Experiment Station that the application of thirty inches of water from a clear mountain stream used for irrigation purposes, added to the soil 6 lbs. of phosphorus, 10 lbs. of potassium, 148 lbs. of calcium and 102 lbs. of magnesium per acre, while experiments at Rothamstead, England, indicate that drainage removes proportionately more calcium and magnesium than of the other elements, hence irrigation water, especially if it contains some sediment, probably adds more to the soil than it takes away, unless used in a very immoderate and unskilful fashion. The vital principle is not to use too much water which brings so many evil results, but just enough to secure the great benefits that come from proper use.

CROPS

The successful growing of crops may be said to depend on six factors, to wit: seed, soil, tilth, plant food in soil, moisture, heat and light. The advantage possessed by the farmer under an irrigation system consists in his greater control over the amount of moisture supplied to the growing crops. That this is a very important advantage is attested by the value of irrigated lands all over the world, based on the returns that may be had from them. It is desired by irrigation, to put in the soil that water which can rise by capillary attraction to supply the plants; any excess over this amount is called gravitation water and is a detriment for reasons already explained and should be prevented where possible, otherwise drainage should be provided; it is a case where an ounce of prevention is worth a pound of cure. The amount of capillary water said to be most favourable for plant growth ranges from about 20% of the weight of dry clay soil to about 4% for a rather sandy soil. It is also said that when the amount of capillary water falls below 80% of the most favourable condition, that the plant begins to suffer from drought.

One of the essential matters in obtaining high yields of various crops is that of getting an uninterrupted and vigorous growth from germination to maturity and irrigation enables the farmer to supply moisture and thus prevent the growth being checked by drought.

The necessity for good seed and having the ground in good tilth is understood everywhere, but there is a tendency at first on irrigated lands to think that irrigation in some way

makes it less necessary to cultivate, but this is not true, as cultivation not only saves by conserving moisture and lessening the amount of water required, but also introduces air, heat, and light into the soil, which keeps it alive and fertile. Since the western soils are high in the mineral plant foods, but sometimes low in nitrogen, which is one of the most important elements in plant food, it is wise to increase the nitrogen contents of the soil by manuring and by the growing of leguminous plants like alfalfa, clover and peas, which have the power of storing a certain amount of nitrogen in the soil in a form available for plant food. The most important of these plants is alfalfa, which responds to irrigation with bountiful yields and is one of the richest forage plants known, so that the raising of alfalfa becomes profitable, without counting on the fact that when it is ploughed up in the crop rotation, heavy yields of following crops will be assured.

No farmer is up to date in the matter of securing profitable returns from his land who does not have a carefully thought out crop rotation adapted to his soil and stock requirements. Since alfalfa is good for all kinds of stock, it usually forms the basis of the rotation and since the best system of general farm management requires a considerable quantity of stock carried on the place, it is well to have about one half of the suitable ploughed land in alfalfa.

The new settler on irrigated lands should keep most strongly in mind that a small farm well cared for is the one showing the greatest profit on the labour and investment required. Farming under irrigation lends itself to intensive methods and requires more labour per acre to secure the larger yields and greater profits. There is no doubt that eighty acres of land well handled with alfalfa and stock will, with a minimum of hired help, produce a comfortable income, but if an additional area of cheap pasture land can be had adjacent to it, it results in an ideal farm. Larger areas can be handled, of course, to advantage if the owner has the capital and ability to manage a larger place, but the tendency in the older irrigated communities is towards small holdings.

I have a few words to add to my paper and I am adding them because the farmers from my Irrigation Block have come forward at this meeting and stated that they did not believe that this country was good for irrigation. Now, I have been here four years in charge of the Western Section of the Irrigation Block and I have lived in an irrigated country since I was eight years old. I was also trained in the United States Reclamation Service under Mr. H. N. Savage, supervising engineer, about whom I wish to tell a little story, I hope, with his permission. Mr. Savage has a little system which he applies to all men working under him.

In a brief manner it consists of this, that a man must know what he is doing, why he is doing it, have the cost record, and also a complete record in writing of everything that has been done from the start to the finish, whether it is a construction problem or a problem of operation.

When I started in charge of the Irrigation Block, I began making records and I want to quote just a few. The question was asked as to what percentage of the people were on the Western Section now that were on in the beginning. I suppose they do not mean in the beginning, but within the last four years. Mr. President tells me that my time is just up, but I want to say that we have a system of crop statistics for the entire Western Section which showed in 1911 one hundred and thirty-six thousand acres in crop, and in 1912 there were one hundred and thirty-nine thousand. In 1913 one hundred and forty-eight thousand, eight hundred and thirteen acres were in crop. Now, this was on lands which are classed as irrigable, but, of course, included some lands above the ditch, where holdings were both above and below the ditch. That shows that there has been no material decrease and perhaps some increase in the amount of land that has been put to beneficial use by cultivation. There have been a few people that have left, but the amount of land cultivated is about the same as four years ago.

Mr. Trego, or some one else, spoke about the rain-fall in Alberta being about fourteen inches. The rain-fall statistics are collected on the Western Section and give unusually complete returns. Gleichen District, from May 1st to August 31st, was 4.63 inches and the crops in that district which were not irrigated or summer-fallowed produced very little result. We have determined by these statistics and observations extending over four years, that irrigation will make a difference in alfalfa of at least the difference of one ton for the dry land per year and three or four tons per year for the irrigated land. We have shown that summer-fallowed crops can usually be increased from ten to thirty-three per cent by irrigation.

We have shown in the two dry years, in the last five, that the difference between irrigated grain and dry land grain is about the difference between fair crops and none at all. I want that to go on record, because the opposite has been stated, and I want also to say that as soon as the men in the Western Section will co-operate in the use of water and in the growing of crops by irrigation and show that our land is suitable to alfalfa, and get the returns desired, then Mr. Trego and his friends will be able to borrow money on that land if it is paid for and in good order. (Applause).

MR. JOHN C. BUCKLEY, of Alberta: I have been much interested in the last gentleman's remarks and I would like to ask him two or three questions. The first I would like to ask Mr. Stockton is, if he will kindly tell us about what time in the growing season he would commence to irrigate?

MR. STOCKTON: Mr. Buckley, irrigation is a matter of supplying moisture to crops when they need it. If you have a season as wet as we have here sometimes, say, as in 1911, you would not irrigate these grain crops, but if you have a dry season you should irrigate them, and the essential thing is that the plants shall grow from start to maturity without being checked in growth. Most of our mistakes have been in irrigating the grain weeks too late, and if it is irrigated at the proper time, and not too much water put on to it, it will be all right.

Mr. Trego stated that a gentleman had shown that fourteen inches of water was sufficient for maximum returns. That is quite right. He forgot, though, that there were seven inches of rain-fall in this particular district, and in his district he had only four or five inches in this particular year.

MR. BUCKLEY: The next question is, I would like if you would tell us how late in the season water might be safely applied to ripen a crop before frost? How late would it be safe?

MR. STOCKTON: Do you refer to grain crops again?

MR. BUCKLEY: Yes.

MR. STOCKTON: We cannot give any definite date there, any more than the other, because it is a question of how much water is in the ground and how much you are going to put on, and also you have to consider the uncertainties of the season. I have here the date of frost for the last ten years. Some farmers may have frost at a certain date and his neighbour on the other side of the hill may be two or three weeks later. He must irrigate, having in mind the climatic conditions and reasonable chances that any farmer must take with rain as well as irrigation.

MR. BUCKLEY: Will you not give us an approximate date?

MR. STOCKTON: I think as a usual thing our grain irrigation should be over by the middle of June. This season, though, was about as dry as 1910, and yet it was a different dryness. We had our dry weather in a different way, consequently we cannot make an absolute rule for the farmer to go by. He must use his head in irrigation as well as in farming.

MR. BUCKLEY: Just one more, please. About what head of water would be proper for a man to irrigate his crops successfully with in the Gleichen District?

MR. STOCKTON: That again depends. A first-class farmer, who has made his ditches close together, and handles his water up to date, can use less head. I have recommended that the Company give each farmer two second-feet of water for each eighty acres they own. I consider that is a fair amount. I have always given a man whatever he could use to advantage, but the idea is that there is not any exact amount, but that is a fair figure in my estimation.

At this point it was moved, seconded and carried that the discussion on this particular subject be extended half an hour.

MR. TREGO: Mr. Stockton gave the rain-fall in Gleichen for 1914, and the figures I gave were for the past seven years as furnished by the Department of Agriculture and should be correct, and I would like to say that I have not seen a farmer in Alberta, since I have been here for the last seven years, who could live for seven years on one crop. In the seven years there have been two years where irrigated grain crops had a chance to mature ahead of frost.

Another thing, for the first four years I was here, I started in with the idea of growing potatoes one year, irrigating them once in place of summer fallow and storing the moisture for the next year's crop. I continued that for four years and I never got one single wheat crop to mature on ground prepared in that way. Now, if Mr. Stockton can give us any better plan to use water on the land to give the grain a chance to mature ahead of frost I would like to hear about it.

MR. STOCKTON: As I understood you, you said you had not been able to mature grain crops on your land in the Gleichen District by irrigation, or to some extent without. The trend of my paper, and all efforts in the Western Section and elsewhere, have been to discourage as far as possible straight grain farming, because the longer we are on that system, the further we reduce the productiveness of our soil and the nearer we get to the point where the cost of farming balances what we get out of it. The growing of alfalfa is a solution of your difficulty; and I will say this, that there is some land which is a good deal more subject to frost than others and Mr. Trego is on one of those places where frost comes unusually early.

Now, I was by Mr. Trego's farm in the Gleichen District, and I believe that he had frost there on the last day of August of this year, and I was at another farm in the Gleichen District on the last day of September, and the man told me, "I have not had any frost yet that would kill anything." There

is quite a difference there, and my advice to the people who have low land within frosty belts is to grow forage crops rather than grain. I think Mr. Trego would easily have matured grain crops under irrigation this year because most of the crops in his district were out of the way before the frost came. I think his grain would have been well ripened had it been properly irrigated at the right time.

MR. HENRY SORENSEN, of Alberta: Now, with regard to frost, I can give this information that it cannot be only Mr. Trego's farm. In 1912, on the 16th day of July, I had six degrees of frost, and there is not a year when I haven't had frost in my grain. The question I would like to put to Mr. Stockton is this: Assuming you have a soil which is heavy, shallow, surface soil, what would you do in putting water over this land to prevent the bringing to the surface of alkali?

MR. STOCKTON: If I had land as Mr. Sorensen suggests, which had a very heavy impervious sub-soil and a light upper soil, I would study the thing from an engineering standpoint; I would look at the drainage and the possibility of ditching and preparing that land. I would then take special pains to prepare that land smoothly, so that the irrigation when applied could be done skilfully, and only that amount of water put on which was approximately required by plant growth. This matter of irrigation is a matter of applying water which is needed by the crops, and when they need that water there must be some proper system of putting it on. Now, your soil and conditions will be helped by careful grading and furrow irrigation, and you can arrange that by shortening the furrows and putting on as small an amount of water as you please.

The experience in your district, and on every farm, is part of the necessities of irrigation. In every Western District there has always been among the first people settling there the statement that they could not raise this or that or the other thing. Many of you who live in the West know that orchard districts were condemned as unsuited for such crops and the first people seemed to have all the bad luck. The fact that there are failures in every country is recognized, but as long as there is a single success, it is worth working up to that particular point, and we have shown that it is possible to grow grain and alfalfa with wonderful results. Now, it is up to us to find out how the rest can do it and I am sure that Mr. Sorensen and Mr. Trego and the rest of them can find that out because they are good farmers.

MR. A. L. FRYBERGER, of Alberta: I have lived in this country two years. Last year we did not have irrigation and this year we had some, and I rise to give you some of my

experiences which are contrary to Mr. Trego's statement, I am glad to say. I recognize Mr. Trego as the gentleman who came to meet a trainload of settlers who came in from Colorado last spring. I have never met him before, but I recognize him now. One of our people told me the other day that if it had not been for these fellows coming from Gleichen and making the statements they had made that this colony would be ten thousand dollars better off. Now, that may seem vague, but I think it is true because the little that they did say soaked in, because in place of using the water as they did in Colorado they were afraid to use it for fear crops would not mature. The result was that where they did not use the water they had no crops, and where they did they had a very successful crop.

My experience with irrigation is this: A German was sent to Germany to find out something about growing sugar beets and he said he didn't know very much about irrigation, but he had an idea that when the crop needed water it was a good time to irrigate. Now, you don't have to be a college graduate to determine when your crop needs moisture. Most any of us can tell that and when it does need it, it is a good time to irrigate. Now, this matter of heads of water, if you irrigate as nearly as possible and follow the rain-fall or get your land irrigated in such a way that it will be wet as if it had been raining, you have reached the maximum results of irrigation. It does not matter if it is a big head or a small head, the main thing is for a man to use his brain along with his muscle to accomplish the best results.

I put in a crop of barley this year and watered it on the thirtieth day of May. The water came late. I watered that barley twice. The second time that I watered that barley was the day before the night of the biggest rain that we had this season. I think perhaps I was apt to over-irrigate, but on the 14th day of August I harvested that barley and it was thoroughly matured and the finest feed you ever saw and a very good crop. My experience at irrigation has taught me this, that it is best to irrigate for grain in the fall. If we cannot irrigate in the fall irrigate as early as you can in the spring. Do not put your water on too late. I have been ten years in the Arkansas valley and I am an irrigationist to the core and my experiences have taught me that in no place has irrigation better effect than it has right here in Alberta. (Applause). I will also say this, that I was interested in bringing twenty-three Colorado settlers here, and there are twenty-three satisfied settlers there to-day and we do not thank Mr. Trego for his information, as I told him last spring. (Applause).

PRESIDENT YOUNG: Do not be personal, if you please, Mr. Fryberger.

MR. SORENSEN: I have not yet received an answer to my question, Mr. President.

MR. STOCKTON: Mr. Sorensen, there are none of our soils, as far as I have examined, that have a sub-soil so dense that they are not subject to a certain amount of circulation by water. Some of them are dense, but no denser than other places. Irrigation where such soils occur must be done more carefully and less water must be put on and deeper ploughing resorted to, but with these precautions you can irrigate any of our land. I cannot do more than say that, because we have irrigated all through the Irrigation Block, in small places here and there, that is one of the reasons why we know such is the case. There have been many half-hearted attempts at irrigation, but if we all try to get together on the matter of irrigation, and caring for our lands, I am sure that success will result from the irrigation of the land you speak of, as well as the more favourable land. If it is a matter of anything that I can say or do to help the matter out, I am willing to meet any Farmers' Union in the Block at any time and discuss any of these questions.

MR. TREGO: I, like Mr. Stockton, do not believe in the straight grain crop and never have done since I have been here. I have never had less than fifteen acres of potatoes since I have been here and I have had as high as one hundred and seventy acres in potatoes. Last year I had eighty acres. I seeded alfalfa in 1907, 1909 and 1910 and I have never had a single crop yet that had passed the second winter and was fit to cut the third year. I grew alfalfa for twenty-two years before I came here, and I have sold as much as one thousand tons in the year, and yet I have not learned how to grow alfalfa successfully in Alberta, and there are none of the farmers in our Block who have. I only know two instances in the irrigation district where it has passed the second winter and where they could get enough the third year to make a paying crop.

As to Mr. Fryberger's statement, I did not come here to have a controversy with any one at all. Mr. Fryberger has been here two years and I have been here seven, and perhaps he has learned more in two years than I have in seven. The fact is that farmers at Bassano did irrigate and did produce very good crops. I was at the Bassano Colony two weeks ago and all the farmers told me of the fine crops they had produced. One told me that he had threshed five hundred and sixty bushels of wheat on sixty acres and the irrigated part had not been threshed separate from the dry part, but he estimated that the irrigated went thirty bushels to the acres. This year's wheat crop in the Gleichen District, with the four and a half inches of rain-fall we have produced all

the way from twenty up to thirty-five and thirty-six bushels to the acre, and one small tract of about three acres made forty-four bushels, without any irrigation at all, and if there had been an irrigated field in the block which produced more than that, I have never been able to find it. I have heard reports on them, but when they come to be sifted down, they have been found to be far less.

Now as to irrigating in the fall, that was my idea before I ever heard of Mr. Fryberger. I irrigated in July, August, and September all the previous years in order to try and make a crop, and I thought I was sure of it in that way, and as I said before, I have never been able to fully mature the



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crop on that ground, and in 1911, after irrigating four hundred and eighty acres in 1910, I put the most of it in oats in order to be sure of maturing it, and I never threshed a single bushel of oats off that field after that.

MR. STOCKTON: I would like to say one thing about alfalfa, and that is that Mr. Trego has said that there were only two fields in the Gleichen District which have passed the third winter successfully. Although I was not in the Gleichen District in 1911, the early fields probably failed through lack of inoculation, and since that time we have had

only about two fields in the Gleichen District which were settled early enough to have gone through more than two winters. The bulk of the alfalfa was seeded under the C. P. R. competition in 1912, and that alfalfa has been going through the winters all right. In other portions we have fields which have gone through three or four winters, although, we do, of course, lose some crops in the winters.

MR. TREGO: If Mr. Stockton can tell us how to grow alfalfa successfully and how to stand the winters, I will buy him the best hat he ever saw.

MR. STOCKTON: The reason the alfalfa you speak of—

PRESIDENT YOUNG: The Chair begs to suggest that Mr. Trego's grievances are purely personal and confined to his own district. We are convinced that Alberta is a very good place for growing alfalfa and all other crops.

The next three speakers show the wideness which our Congress covers. One of the next three speakers is the Chairman of the Board of Water Engineers for the state of Texas. The second is from the state of California and the third is the Commissioner of Trade and Irrigation from Australia to the United States and Canada.

I have much pleasure in introducing to this Congress Mr. Nagle, Chairman of the Board of Water Engineers to the state of Texas. (Applause).

Address by

J. C. Nagle

Chairman Board of Water Engineers, State of Texas

SOME IRRIGATION PROBLEMS IN TEXAS

Mr. Chairman and Members of the Congress and Visitors:

From Texas to Alberta is more than a few rabbit's jumps, even for a Texas Jack-rabbit. Nevertheless the pleasure of being with you and being the recipient of the hearty welcome extended by Calgary, Alberta, and Canada, to all our visitors is worth the journey many times over.

You do big things, and do them quickly, along all lines of material development here in your country of great possibilities. To have the chance to see the wonderful work being done in irrigation alone is an opportunity of a life time. The difficulties to be touched on in this paper will, I fear, seem trivial to you, but for what they may be worth I present herein my comments upon some of the problems which

have confronted my associates and myself during the past twelve months.

The Board of Water Engineers for the state of Texas is but a little more than one year old. Up to the present time our energies have been chiefly devoted to organizing and to collecting data regarding irrigation plants and systems which were in existence when our Board entered upon its duties. In addition, we have had to pass upon quite a number of applications for permits to appropriate public waters, and in passing upon these we have been confronted by some problems, the solution of which will require time and patience, and probably additional legislation.

We of the irrigated sections are accustomed to large distances and wide ranges in altitude, in rain-fall and in climate. Nevertheless, to emphasize the difficulties of regulating irrigation in Texas, a few words about the physical conditions there should not be amiss.

In latitude Texas extends through slightly more than ten and one-half degrees, and in longitude a little more than thirteen degrees. Her northern boundary lies on a parallel only about forty miles south of Cairo, Illinois, while Brownsville, near her southern limit, is in about the same latitude as Miami, Florida. The area of the state is 265,896 square miles, or 170,173,400 acres, or nearly one-ninth the total area of continental United States, excluding Alaska. It requires the combined areas of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina and one-third of Pennsylvania to equal that of Texas. Texas has over 400 miles of frontage on the Gulf of Mexico and 960 miles of international boundary, measured with the meanders of the Rio Grande River. Within her boundaries altitudes range from sea level to 9500 feet. The mean annual rain-fall ranges from about 49.5 inches at Alvin (about 48 for the eastern coastal region on an average) to less than 10 inches at El Paso. And, paradoxical as it may seem, irrigation is more extensive in the region of heaviest rain-fall than in any other portion of the state.

Although Texas has been the last of the irrigation states to enact anything approximating adequate legislation for the conservation and regulation of her water resources, the practice of irrigation in the state antedates all known records. In the early part of the sixteenth century Coronado found irrigation successfully practised in the vicinity of El Paso. Tradition has it that the Yuma Indians, centuries ago, constructed irrigation canals on the Pecos river and evidence of prehistoric systems have been found at other points in the western part of the state. The Franciscan Fathers, early

in the eighteenth century, began the establishment of a chain of irrigation systems in connection with their missions.

The greatest single impetus to irrigation in Texas came with the cultivation of rice on a commercial scale. It has been estimated that in 1890, there were 135 acres planted to rice in Texas. In 1900, not less than 9,000 acres. Within a very few years, this increased to one-quarter of a million acres. The total acreage under irrigation in the state is as yet unknown, but within a short time now the Board of Water Engineers will be able to make a pretty close approximation of all except that from wells. The data contained in about 900 reports now on file are being tabulated and prepared for publication.

As early as 1852, the fourth legislature of the state of Texas passed a law authorizing the regulation of irrigation. Other acts relative to irrigation were passed in 1876, 1882, 1889, and 1895. This last named act was the most comprehensive of any of these above named and remained in effect (theoretically, but not effectively enforced) until the General Irrigation Law of 1913 was enacted. An irrigation district law was passed in 1905, but has been superseded by the District Irrigation Law of 1913.

The General Irrigation Law divides the state into three water divisions and provides for one member of the Board of Water Engineers to be appointed from each of these divisions. Provision is made for a secretary and office force and for necessary technical assistants. The Board is charged with the administration of the law as regards permits for the use of public waters for "irrigation, mining, milling, manufacturing, the development of power, the construction of water-works for cities and towns, or for stock raising."

In passing upon appropriations, the Board of Water Engineers constitutes a quasi court and has power to grant an appropriation, in whole or in part, or to deny outright. The Board also has authority, in the case of failure of the interested parties to agree, to fix the rates for the use of water from a storage reservoir by a canal company, and for the rental rate under a canal system. Also to prescribe rules for the regulation of the conveyance of stored water in a stream channel from the point of storage to the place of use. It is also charged with the measurement of streams, surveys of reservoir sites, investigations of the duty of water, and a number of other things.

All decisions of the Board relative to appropriations, or to the establishment of rates, are subject to review by the district or higher courts in the event that appeal is taken.

In the discharge of its duties, the Board has encountered quite a number of legal and other problems, a few of which will not be considered.

The conflict between riparian rights, or of the claims made under it and in the sacred name of "Vested Rights," and the right of appropriation is not confined to Texas. The decisions of the Texas courts regarding the right of a riparian owner to the use of water for irrigation are conflicting, and the extent of such rights remain indefinite and hazy. If all riparian rights, except that of domestic use, could be wiped out, our troubles would be cut in half and the economic development of water uses increased many fold.

Appropriations from inter-state boundary streams have so far touched only the Sabine river on the east. The Rio Grande involves international questions, the general regulation of which present treaties between the United States and Mexico do not adequately cover. Such permits as the Board has issued for appropriations from the Rio Grande have specifically stated that these are subject to the regulations of the Federal Government. The Pecos, the Canadian and the Red rivers contain possibilities of inter-state conflicts later on.

In some sections of the state very considerable areas are irrigated from shallow wells and in others from flowing and non-flowing deep wells. Shallow well development has been most pronounced in the rice belt to the west of the Colorado river, and in the vicinity of Plainview on the great plains in the northwestern portion of the state. There are a number of other sections where this source of water supply is being developed to a very considerable extent. Irrigation from flowing wells is being practised on a comparatively large scale in the vicinity of San Antonio, and to the south and west of that city.

The law of 1913 is not explicit as to the relations of the Board of Water Engineers to this source of supply, except that reports showing the logs of new wells must be furnished to the Board, and failure so to do carries a penalty. Waste of water from an artesian well also carries a penalty. Whatever may have been the intent of the legislature which enacted the law the office of the Attorney General of the state rules that the Board has no jurisdiction over wells except as to the record of borings. The consequence has been that no claims to the use of well water for any purpose have been filed with the Board, and so far no means have been found by which to obtain reliable information regarding the acreage irrigated from wells, or other uses to which well water is being put. Some kind of regulation should be required, however, to prevent over development of this field, and injury to the earlier interests dependent thereon, and to provide for the collection of reliable data. In some localities the ground water level has been materially lowered by overdrafts from too many wells, and material losses either have already become apparent or may be expected.

Another question upon which many practicing attorneys put a construction radically different from that of the Board concerns the Board's relation to springs, the water from which is utilized for one or more of the purposes named in the law. These attorneys contend that no filings need be made with the Board for water from springs, no matter to what use it is put. In at least one case, where the springs supply nearly fifty cubic feet per second, the water is all used in irrigation upon the lands owned by the parties who own the springs. Formerly this water found its way into natural surface channels and flowed past the lands of others. It still does so during the months when no irrigating is being done. The owners of these springs refuse to recognize any jurisdiction over these waters by the Board and the matter may have to be threshed out in the courts.

Other attorneys question the jurisdiction of the Board over the waters, other than flood waters, originating on, or flowing past lands the title to which passed from the state prior to 1895.

In the southeastern portion of the state the streams have a fairly large perennial flow, and the same is true of the lower Rio Grande. In the former locality the heavy drafts by immense pumping plants during the rice irrigation season not infrequently result in drawing salt water in from the bays and inlets leading into the Gulf of Mexico. In some cases, dams or bulkheads have been built across the streams to hold back the salt water at seasons of low water or when extra heavy drafts are being made on them. In one case an irrigation district has been formed which embraces the lands served by two canal companies but not those of a third which takes its water from the same bay and bayou as the other two. The district has built a bulkhead below these plants and has thereby prevented salt water from backing up to the intakes of all three of the pumping plants. The last canal company above referred to refuses to enter into a contract with the district or to make any payment for the use of this sweetened water. The Board of Water Engineers has rendered an opinion in this case and, if the canal company and the district fail to reach an agreement, formal action by the Board may be necessary.

By far the greater portion of the state contains streams which either carry a very small low water flow or cease running altogether. In such sections irrigation development is necessarily dependent upon the storage of flood waters. On some of the larger streams, such as the Trinity, the Brazos and the Colorado rivers, feasible storage sites can be found only upon the upper reaches of the rivers, and upon the conservation of the storm and flood waters future irrigation and power development along these streams, and also

the water supply of cities and towns, must depend. The law of 1913 is designed to foster this line of development, and provision is made whereby such stored water may be utilized at points lower down the streams. In some cases such use will eventually be made at points several hundred miles below the storage reservoir. One of the problems of the Board of Water Engineers involves the control of this water in its passage past the headgates or pumping plants of intervening systems. It is clearly possible that difficulties will arise in this connection.

As between small early appropriations from the normal flow and later large appropriations where the chief feature is impounding, conflicts will arise and already have arisen. Clearly, the larger units which utilize water which would otherwise find its way direct to the gulf, are of the greater economic value to the state, but the Vested Rights Bugaboo stands defiantly in the way, making difficult this larger development. Along some of our streams, particularly the Colorado and its tributaries, there are scores or even hundreds of small plants, most of them pumping propositions, which serve, in the aggregate, a smaller area than could be served by a single large impounding system. The aggregate first cost of these small plants may exceed that of the single large one, and always the cost of operation is greater, while the efficiency is lower. What course to pursue in such cases is another of our problems. The policy of the Board has been, and will continue to be to encourage that form of development which will make for the greatest good to the state or locality as a whole.

Perhaps the largest single problem in every irrigated section, the general solution of which is yet to be found, has to do with water waste. The effect of this waste is felt most keenly in those sections where the supply is limited, but it obtains on practically all the systems, large and small, in Texas. In this one factor alone frequently lies the difference between failure and success. It is common knowledge that very few large systems have proven profitable to the companies supplying the water. It is possible, however, to improve this condition by better design and maintenance of canals and laterals, as well as headworks or pumping plants, but the principal remedy must be found in the improvement of the farmer's distribution ditches and his method of applying the water.

Water losses in main canals and laterals are far too high in most cases, but it is in the field where the greatest losses occur. The water user applies two, three or even four times as much water as is necessary on portions of his field, or on all of it in many instances, and by neglecting proper cultural methods allows it to evaporate or to seep away. One reason

for this lies in the attempted cultivation of areas too large for the water user to efficiently handle. In his inexperience, he seeks to increase his yields by increasing his acreage instead of the efficiency of his methods. He will learn only by costly experience, and often not even then. Water is furnished him at a flat rate per acre. Therefore, he thinks himself the gainer when he uses more than is necessary, or more than is his share. He will calmly see his neighbour suffer for lack of water while his own field levees are leaking and his lands are being drowned, and will pride himself upon having gotten all he thought was his due. The system is overtaxed and the canal company steadily loses money in operating expenses. When the rental rate is raised to meet these losses, a howl goes up from the water user who considers himself oppressed.

One partial remedy for this waste lies in basing rentals upon the quantity of water used instead of the acreage served. Unfortunately, some existing contracts cover a period of fifty years, at a flat rate. For those the remedy is not apparent. The manager of one of the rice canal companies in east Texas told me last spring that for the season of 1912 his pumps were taxed to their utmost capacity to supply water to 14000 acres of rice. By a systematic campaign with the 1913 water users, and with their co-operation in the effort to apply the water more economically, the same pumps were able to serve 18000 acres, notwithstanding there was less rain-fall during the 1913 season than there was during that of 1912. This manager was convinced that if water were sold on a quantity basis a much larger area could be served and equal yield results.

The silt problem is an ever present one where storage reservoirs are filled by streams carrying large quantities of sediment, and also in canals diverting water direct from such streams. The rivers of eastern Texas are, in the main, comparatively free of sediment but those originating in the arid and semi-arid sections carry large quantities at flood times. No adequate solution of this problem as it relates to storage reservoirs has yet been found, but the deposition of silt in canals can be prevented by intelligent design and use. Suppose two canals having the same depth and delivering the same quantity of water but one twice as wide as the other, and a velocity in the smaller sufficient to prevent silt deposition, while that in the larger is not, the channel of the larger will steadily decrease by reason of deposits until the decreased section requires a velocity sufficient to prevent deposits. This canal may go further and decrease its cross section to such an extent that it will not deliver even as much as the other which had originally only half its area. This reduced capacity is often due to the growth of vegetation in and upon the silt deposits.

The seepage loss will always be less in a well designed canal than in one built too large, especially when crossing porous soil. For the two canals imagined, if the larger permits a loss of 50 per cent. in transmission the latter should permit but 25 per cent. loss and the relative efficiencies of the two will be as 50 to 75.

One of the important duties of the Texas Board of Water Engineers is to investigate the duty of water, and we believe that in many cases where the duty now is as low as fifty acres per cubic foot per second it can, by intelligent regulation of the carrying and distributing systems, and especially in rates of application and in cultural methods, be trebled or even quadrupled. Manifestly, the duty will differ in widely separated sections because of climatic, topographic and geologic differences.

The question of private versus public ownership of large irrigation systems is so broad that only a passing reference will be made to it here. Nearly all Texas irrigation systems are now privately owned, but there appears to be no good reason why public ownership, or even a combination of private and public ownership, should not prove successful. Perhaps, the most satisfactory arrangement for operation and control of extensive systems is to be found in the irrigation district. In two or three instances large and long established systems have gone over into irrigation districts in Texas, and another district which will supersede a number of well established systems, is in process of formation. The irrigation district plan appears to offer a means of solving many of our present problems.

That there should be efficient state control of both irrigation districts and private enterprises is obvious. By reason of failure to enforce the priority provisions of the 1895 law, many of the earlier irrigation systems, involving heavy investments, have proven failures, when later systems have absorbed the available water supply or have so reduced it as to starve the earlier ones out. This is pitifully apparent upon the lower reaches on one river in Texas where the first plants were established well toward the mouth. Later users built their pumping plants higher up the stream so as to have first go at the water. These, in turn, were put on short rations at times by still younger plants located yet farther up stream.

When reports covering irrigation plants or systems which existed at the time the 1913 law went into effect came into our office it developed that the majority of the smaller irrigators, and a number of the larger ones, had previously made no attempt to comply with the requirements of the 1895 law regarding filing of claims in the offices of the county clerks. The penalty provisions of the 1913 law has brought most of these in now, and no new plants can be installed without

permits from the Board of Water Engineers, except in violation of the law. It is regrettable that penalties are necessary to secure compliance with the law, but the fact remains that the necessity does exist. (Applause).

Mr. President, and Ladies and Gentlemen, I thank you. (Applause).

PRESIDENT YOUNG: If there is no discussion we will proceed to our next matter. Before proceeding however I will state again that there is a Call of the states to-morrow, and each state or province will have five minutes to be devoted to subjects or papers as you may select.

I may state gentlemen, with reference to the next number, that Mr. L. A. Nares, of California, was upon the programme by misunderstanding as yesterday morning. We had been given to understand that Mr. Nares had prepared a paper, but he had not been apprised of that fact and had not prepared a paper. He has, however, kindly consented to read a paper by Mr. A. L. Cowell, Field Secretary for the State of California for the Panama-Pacific International Exposition, on the subject of "Recent Irrigation District Legislation in California." I have pleasure in introducing Mr. Nares, who will read to you Mr. Cowell's paper. (Applause).

Paper by

A. L. Cowell

Field Secretary, Panama-Pacific International Exposition

RECENT IRRIGATION DISTRICT LEGISLATION IN CALIFORNIA

Paper read by L. A. Nares, of California

Mr. President, Ladies and Gentlemen:

This paper is prepared, as our President has stated, by the present field secretary of the Panama Exposition Association but Mr. Cowell enjoyed his best opportunities of preparing for the subject of this paper while he was field secretary for the Irrigation District Association of the state of California. His work led him into this particular field and practically all the legislation relating to California. His paper is as follows:

In 1887 the legislature of California passed the Wright Law, authorizing the formation of public districts for the construction and management of irrigation systems. It was hailed with enthusiasm, and a great many districts were organized within a few years. Partly as a result of ignorance of the fundamental principles of successful irrigation, partly

doubtless because some of the districts were promoted fraudulently for speculative purposes, and partly because of long and bitter litigation over the constitutionality of the Wright Law, many of the districts failed. Several of them, however, fought out the principles of public ownership and management of irrigation systems, and are now convincing demonstrations of the success of that policy.

In 1897, before the litigation had been ended, there was serious talk of repealing the Wright Law. It was agreed that the ease with which districts could be organized under it had made possible some abuses, and finally the law was superseded by another act, based upon the same principles, but making the organization of districts difficult by requiring the written consent of a majority of the property owners in a proposed district, who must represent more than half of the assessed valuation of the land, before an election, to determine whether a district might be formed, could be called, and then requiring a two-thirds majority of the votes cast at the election in order to authorize its formation.

The result was that for a dozen years there was very little thought given to the organization of new districts in California. In the meantime, the constitutionality of the Wright Law and the validity of the districts properly organized under it had been upheld, and the extraordinary development in the Modesto and Turlock districts, in Stanislaus county, and the Alta district, in Fresno and Tulare counties, has called attention to the advantages of the district plan, under which, to quote the slogan of the Stanislaus county districts, "the land owns the water." As a result, two new districts—the South San Joaquin and Oakdale—were organized in the northern part of the state, and in the southern part the people of the Imperial Valley organized a district to take over their privately owned system, and the unique colony of Little Landers, organized by William E. Smythe at San Ysidro, formed the smallest district in the state, consisting of about 500 acres. Later several other districts were formed, and there is a growing conviction that further important irrigation development in California will be largely under the district plan.

This belief is based not so much on the increasing sentiment in favour of public ownership of public utilities, as upon the recognition of the fact that a privately owned irrigation system confers on a community many indirect benefits from which it cannot derive revenue, and in a region where sub-irrigation is general, many landowners receive direct benefit from the canal system but cannot be made to pay for it. Under the district plan, the benefits are assessed to all who receive them, and, exempting improvements from irrigation assessment, as is done in California, in all districts organized

since 1909, and in such old ones as desire to adopt the policy, the holding of unimproved land to get the benefit of the industry and enterprise of others is effectively discouraged and rapid development is the result.

When the new irrigation districts began to be formed in California, the first problem encountered was to find a market for their bonds. We found a general distrust of securities based on irrigation projects and legal discrimination against the bonds of irrigation districts. Consequently it was almost impossible to interest investors in the bonds of the new districts.

We made a systematic study of the causes of the attitude of the investing public, including an investigation of the reasons for the failures of many of the districts organized under the Wright Law. We then set about the securing of legislation with four objects in view:

First, the prevention of the organization of the "wildcat" districts and issuance of bonds for impracticable projects.

Second, the strengthening of machinery to insure the collection of assessments for the payment of the obligations of the districts.

Third, giving the districts the benefit of the advice of the experts in the state engineer's department, in order to promote efficiency of management.

Fourth, securing for safeguarded irrigation district bonds the legal privileges accorded to other high-class bonds, in order to widen the market for such district bonds.

Under the present constitution of California, which guarantees almost absolute home rule to municipal organizations, some of the things we sought to do cannot be done, and an amendment to the constitution will be voted on at the election in November, to authorize the Legislature to provide for more stringent supervision of irrigation, reclamation and drainage districts, if it is deemed desirable.

However, we secured some important modifications of the law of California relating to irrigation districts. They may be summarized as follows under the headings indicated above:

First. (a) The state engineer is given the power to veto the organization of a district if the project is impracticable.

(b) Before an irrigation district can issue bonds, it must submit plans and its engineer's estimates to the state engineer and get his report thereon. Under the constitution the state engineer cannot prevent the issuance of the bonds, but in the face of an adverse report the bonds would probably not be voted.

(c) Before the bonds of an irrigation district can become legal investments for the funds of banks and other institutions under public control, they must be approved by a

state commission composed of the state engineer, the attorney general and the state superintendent of banks. If the commission finds that the irrigation system of the district, and the specific object for which the bonds are desired, or have been issued, are feasible, and that the total bond issue of the district does not exceed 60% of the market value of the lands within the district and the water rights and irrigation works of the district, the bonds are certified by the state controller as entitled to be purchased by banks, insurance companies and trust companies and as legal investments for the state school funds and any other funds in which municipal bonds may be invested. While examination by this commission is not compulsory, it is demanded by investors. The state superintendent of banks has ruled that irrigation district bonds, which have been approved by the commission, may be used as security for loans from state banks up to 90 per cent of their market value.

Second, the security of irrigation district bonds has been strengthened.

(a) By increasing the penalty for delinquency in paying assessments from 5 per cent. to 10 per cent.

(b) By requiring the district attorney, of each county in which the office of an irrigation district is located, to see that the assessments required by law are levied and collected, for under the law, if the district officials refuse to perform their duties in these respects, the corresponding county officers must perform them.

(c) By making it the duty of the attorney general of the state, if it appears that assessments for the payment of obligations hereafter incurred are not collected, to institute court proceedings to compel the meeting of the obligations. Thus the power of the state is put squarely behind the enforcement of these obligations.

Third, the districts have been brought into direct touch with state officials, not only in the manner outlined above, but by a requirement that each district submit annually to the state engineer a report of its activities, and the state engineer is authorized to make to any district such suggestions as he deems proper, during the construction of any work to be paid for out of the proceeds of the bonds, the secretary of the district must make monthly reports to the state engineer, showing the expenditures.

Fourth, the market for irrigation district bonds was enlarged by giving to such bonds, as might be approved by the state irrigation commission, practically all legal privileges enjoyed by county, municipal or school district bonds, and by adoption of a constitutional amendment allowing the use of irrigation district bonds as security for deposits of public money in banks.

It should be noted that our new legislation pre-supposes that the districts shall have a reasonable margin of security for their bonds in the market value of their lands. We have not sought in this legislation to meet situations in which land has practically no value until an irrigation system has been completed. That must be met by a system of state supervision that will prevent the issuance of bonds unless it is certain that an adequate supply of water is to be brought to land suitable for irrigation and under circumstances that insure the success of the project.

It should be stated that this legislation has not had the effect upon the prices of irrigation district bonds which we had expected. Prices for such bonds are lower in California now than two years ago, before most of the legislation was enacted. I would give three reasons for this fact:

First, the general decline in the prices of securities.

Second, the failure of the districts to give proper publicity to the increased safeguards that have been put around California irrigation district bonds.

Third, the facts that the legal effect of the legislation is confined to California, and the market has been overstocked with bonds of new districts, while there has been no concerted effort to take care of the few holders of these bonds who have been compelled to turn them into cash and have sold them for whatever they could get, thus abnormally depressing prices.

In seeking for a market outside of California, we have met prejudice against irrigation bonds of any kind, and we found it almost impossible to get investors to consider the proofs of the soundness of our securities. This has led to suggestion that the state itself buy the bonds of the districts, securing the funds by issuing its own bonds, which would undoubtedly sell at good prices. An effort was made this year to secure the submission of a constitutional amendment to this effect, by means of an initiative petition, but it was given up on account of the expense. The idea will undoubtedly be pressed at the session of our legislature next year. In these days of agitation for rural credit systems, we believe that every effort should be made to secure for the farmer credit at reasonable rates for the primary operation of putting water on his land.

This concludes Mr. Cowell's paper, and I will, with your permission, Mr. President, only for a few minutes, revert to not perhaps this subject, but a few of the salient points which have been brought up in discussion here. First, I will state that I came from that part of California which started irrigation in 1870. We are still, after forty-four years, grappling with the same problems which we have heard discussed at this Congress. Four-hundred-and-thirty thousand acres are under irrigation under the management of the company which

I represent. The same trouble exactly existed and the same trouble will exist as long as men are men and as long as new problems suggest themselves. In our work we have had to do a great deal in colonizing the land. I would like to make a few suggestions. The first is that no sales should be made to any one who is not going to improve land. That has been our experience and in our colonization of over one-hundred-and-eighty thousand acres of land our average amount to a family is less than thirty acres, and we have had but two failures out of twenty-eight hundred sales. Men did not try to take on too much at once.

Another piece of advice that I would give from my experience is, "never let your water be paid for by so much per annum per-acre, let it be paid for by the acre-foot, or a proportion thereof, on a graduated scale from what has been determined as the best use of water, the highest price being paid for the largest amount. As a result of the other process in Fresno county and Kings county, out of six hundred thousand acres, under irrigation, over one hundred and eight thousand acres are pretty nearly reduced to nothing by alkali, and it will require at least fifteen to twenty dollars per acre to restore that land to its original state of cultivation.

I have also to suggest this. A great deal has been said about the difficulty of getting settlers on the projects which have already been completed and those which are about to be completed. The basic value of land plus the water must be the measure of the success of any enterprise and that basic value must be low, and the settler must see in his investment some profit, and at the commencement must see some chance to make a profit. That is essential. In my experience I have had a problem such as lies at your door. I have analyzed your capital price of development, your annual charge and your price that is asked for the land on the irrigated area in Alberta under the C. P. R. system. I find that fifteen dollars and sixty-six cents was the capital charge, a very moderate figure for the system which I understand it has, and that ninety-one and two-third cents is the average cost of the water. It compares very favourably with the prices we have been charging, which range from fifty cents to one dollar, making an average of about seventy-five cents per acre in the Fresno area, where we have developed six thousand acres. As to your sale price, it averages from thirty-five to forty-eight dollars and sixty-six cents per acre. To be able to present to settlers good land under good irrigation systems at that moderate figure, I think will make in your country what it has made in my country of California. I have therefore great pleasure in saying that since coming to Calgary, I have become an optimist for the irrigation possibilities of Alberta, since I have had a chance to look into the figures. I thank you Mr. President. (Applause)

MR. DENNIS: With your permission, Mr. President, Ladies and Gentlemen, I want again on behalf of the province of British Columbia, especially the Honourable, the Minister of Agriculture, who will address you to-night, to say that he has sent up some more sample apples which I will be glad to have you try.

Introduction of

Peter Von Weymarn

of the Department of Agriculture of Russia

PRESIDENT YOUNG: We have with us this afternoon a gentleman from far distant Russia, a gentleman who came here from St. Petersburg, but who will return to Petrograd. Mr. Peter Von Weymarn desires that on his behalf I should extend to you the greetings of the Department of Agriculture of the great Empire of Russia. Mr. Von Weymarn has attended this Congress at the special request of his department and we feel honoured that this request was made and that Mr. Von Weymarn is with us.

I have pleasure in introducing to you Mr. Von Weymarn, of Russia. (Applause).

PRESIDENT YOUNG: Now, our next and concluding number on this afternoon's programme is an address by our old time friend and adherent of the Irrigation Congress, Mr. Niel Nielsen, Commissioner for Trade and Irrigation from Australia to United States and Canada, who we are especially privileged in having the opportunity of hearing.

Mr. Nielsen, Gentlemen. (Applause.)

Address by

Niel Nielsen

Commissioner of Trade and Irrigation from Australia to the United States and Canada

Mr. Chairman, Ladies and Gentlemen:

I think the people of Calgary and of Alberta should be congratulated sincerely that this is the first time the great International Congress has taken place outside of the United States of America, and I am pleased, as an Australian, to note that the first time it has taken place outside of the United States is to take place upon British soil, in the province of Alberta, in the Dominion of Canada. (Applause) Although since I have been living in America, I see very little difference between the people of the United States and the people of Canada, I find myself quite at home in the United States as

I find myself in Canada. You are all very much like the people whom I represent here to-day. You are drawn from the same stock, and you are keeping up the traditions of the great Anglo-Saxon race on this side of the World, as we are trying to do down south in Australia. (Applause).

This is the third or fourth time that I have had the privilege of addressing the Irrigation Congress, and I believe that in addressing this Congress I have a privilege that any one should be proud of, in-as-much as this Congress is a body of men collected together for the purpose of giving instruction in regard to this great subject of irrigation, and is in my opinion a body of men who would be worthy of the appreciation of any people on the face of this earth. I believe that you have collected together at this great Irrigation Congress the greatest amount of scientific knowledge in regard to irrigation that is collected at any Irrigation Congress or any meeting in connection with irrigation in any part of the World, and therefore, ladies and gentlemen, I deem it a privilege, as well as a duty, in coming here to address you on behalf of the people of Australia.

In Australia we have not had a great deal of experience with irrigation, in-as-much as we have hardly got beyond the pioneer stage, and there is another great reason, gentlemen, why we have not had a great deal of experience in irrigation, and that is owing to the fact that our country stretches from east to west as wide as the great United States of America, from north to south a good deal wider than that great country, and we have within the four corners of that tremendous area of land a population of only five millions of people, so you will realize that these people in that tremendous area have quite enough room to turn around at any rate, and that is the reason that we have not got anywhere near any extent of intensive farming. The time is coming, though, as far as the eastern seaboard of our country is concerned, when it is desired that the lands closer to the seaboard should be cultivated in more intensive form than in days gone by. To do this we must supply the water from our rivers to the soil, instead of depending solely on the Creator to send it down from heaven.

I came over here four or five years ago to get information on this great question. I have been back two or three times, and each time I have transmitted to the people, who are working out their destinies on the irrigation systems there, the information which I have obtained in this country and a great impetus has been given to irrigation in our country as a result of my giving them the information I obtained in the United States and in Canada in regard to this question. I hope to be able to take back more valuable information from this Congress, than I have ever before been able to. Primarily, because I am beginning to realize what the question really is,

to understand what irrigation means to the farmer in any dry country, and I am beginning to see by practical experience the splendid results which have taken place in countries like this and the United States, where the methods have been applied with intelligence behind them as well as with muscle.

After all, we must look at the farming business the same as any other business. We must not think that anyone could be a farmer. We must have men with intelligence as well as with muscles, because we expect it from people who follow other businesses. That is more applicable to the irrigation farmer than to the dry farmer or to any other class in our community. I believe that the time has come in this country when you are putting on the soil the most intelligent section of your people and by doing that you will bring the operation of farming up to a level to which it has never reached in the past. Intelligence is just as important as brute force, which means putting all the muscle you have into farming as well. I think the farmers of America can show that they are succeeding by a proper combination of muscle and intelligence.

I have given you an idea of my country's area and also of the population in that area. We must approach irrigation from a somewhat different point of view than you are able to approach it, having the population right at your door. Most of the things that we raise in Australia have to bear the cost of transport to the other ends of the earth. We are a producing country but are separated by tremendous distances from our markets. You people in America are the nearest white neighbours that we have. The country that some of us come from, situated in the British Isles, is 13,000 miles from where I live. On the other hand, the borders of Canada and the western borders of the United States are quite close—they are only about 7,000 miles away from Australia.

We do not hope to bring the products of our irrigated fields to you, though, to sell to you in competition. What we believe we will be able to do is to help the two great branches of primary production on which we are engaged at the present moment, pastoral production and dairying production. I believe that I may say that Australia is the greatest pastoral country in the world. As far as sheep raising is concerned, it certainly is. We have 100 million sheep within our borders. These sheep are not raised because they are mutton, but because they have wool on them. We raise them for their wool. If we can sell the mutton, all well and good, but if not, we have the wool anyway. Last year we sheared over 800 million pounds of wool from our sheep. There is no other country that produces over half that quantity.

Now, in connection with this we will have to use irrigation for the purpose of assisting that industry to the fullest possible extent. We have a great area of dry country. Australia can

be divided into three almost equal portions. On the first portion, there is a rain-fall of some twenty inches and upwards, and I mean by that, a good way up. I recall an incident when I was travelling in the northern part of Australia. I met a man and it was a very wet day. The man said "It is a bit damp to-day," and I said "it certainly is." It was raining cats and dogs as we say in our country. "How much rain do you get here every year?", I said, and he said, "three and a half yards." I said, "what"? and he repeated it, and said, "yes, ten feet, six inches." I could not realize that, because I had never heard of rain being calculated except in inches, and he said, "it is a hundred and twenty-six inches, if you want me to do your arithmetic for you."

Taking Australia as a whole, it can be roughly divided into three portions. About one-third of it has more than twenty inches of rain, another one-third has between ten and twenty inches, and the last one-third has less than ten inches of rain-fall. We are not bothering much with that last part at the present time. We are using that for dry pastures. We are doing the greatest part of our dry-farming on the middle section of the country which has more than twenty inches. We are using that generally for the purpose of growing sugar cane and other tropical products and raising cattle for dairying, which is the second great industry of Australia. Last year we sent to London 200 million pounds of butter.

Now, why do we go on producing this class of product and not go up to a higher form of production? Simply because we are compelled to produce these products which are valuable in proportion to their weight. We can send wool to London and the total charges, shipping, marketing, selling and everything else connected with the sale of wool in large amounts, only come to about six per cent. of its value. We send butter to London, and the total charge in connection with that, including everything, comes to about seven per cent of its value. We can send beef or mutton, and the total amount added is about twelve per cent, but if we want to send wheat, or other products of that description, we have to pay to the agents and the shippers over twenty per cent. of the value of the crop. That is the reason that we can never hope to be any great competitor in the markets of the world in regard to wheat, but in regard to those other commodities, on which the charges are so comparatively small, when they only add a small percentage on to the value of the article, I say, we can compete against the world and we have done so and we are doing it successfully.

Now, in regard to irrigation by reason of following what you have done in America and by reason of profiting by your mistakes, if you have made any, we have come to the conclusion that the basic principles must be that the water shall

forever belong to the people as a whole, and not to individuals, and we have a law that dismisses riparian rights altogether when the necessities of the people demand it. (Applause). We are all out to do what is necessary for the hard working man, and he is a farmer very often indeed. Most people when you talk about the working man think that you allude to the man who takes off his coat in the street and works there, but my experience of the good farmer, and the man who will become a successful farmer, is that he is the hardest working man within the four corners of any country and we are pleased that all our laws should be based on the principles of giving every concession and consideration to him, because he is the hardest working man in our country.

After all, who is it that makes our country? It is not the millionaire, it is the man who takes his coat off and does the hard work. The man who should rule the country, and receive consideration in regard to all the laws, is the working man, and we believe in Australia, that the basic principle of every scheme of irrigation must rest on the fact that there will be no difficulty in regard to water rights. We have made a law there which provides that, when the necessity of the people demands it, the water rights shall rest in the government and no one else. They own the water underneath the land as well, so that it can be brought up by people who own the surface with the idea of giving them the opportunity of benefiting the people who are compelled by reason of their situation to require some of that water to enable them to make a living on their land.

There are no difficulties about water rights there. All the water rights belong to the government. Now, let me tell you something else that the government does. We tell the people that they will have no water difficulties. Having provided that all the irrigation projects must be built by the State, and the land sold or leased to the people by the State, and that the State should continue to control the dams and the water rights, taking the whole responsibility of keeping them clear of silt, and the up-keep problems of the system, and charge their price to the consumer, we are going to find out if that proposition is a feasible one consistent with doing the fair thing, not only by the people on the land, but all over the country. From what we can see at the present time, it is going to pan out successfully for all parties concerned.

In the province of New South Wales, it was decided to start irrigation by the institution of a large project. It was found that the land in a particular valley, the valley of Murrumbidgee, was being used for sheep raising and the capital value of that land was about \$12 to \$15 an acre. Some of our experts we got from the United States, of whom Dr. Elwood Mead was one, told us that the area was the best we

could have for irrigation. It was a deep valley with a good sub-soil and good drainage and in a good situation, with a small but reasonable rain-fall and with everything in its favour that could possibly be in favour of an irrigation project. But this land was owned by four or five very large land owners. The area was 350,000 acres.

The government went to these land owners and bought back that land before they put a pick in the irrigation works, so that they would get the land without the added value of the works. They bought that land at \$12 and \$15 an acre and it is now worth \$75 or \$100 an acre, because of the water which has been put there. They built all the necessary works and cut all the channels, and they got everything ready before they started to settle the people on the soil. When the people came to settle, they did not ask them if they had a great deal of money. They said, "how much have you?" "If you have not enough for your house, we will lend it to you, and if you have not enough to pay for your grading, we will do it for you, and you can have fourteen years to pay for it." "We will fence your land for you too." We were able to do this by the fact that the government of Australia owned practically all the savings banks, which control the savings of the people. (Applause).

You might think from what I have been telling you that Australia is a socialistic country, because the government has control and so on of so many things. So we are, and we believe that we have arrived at that particular stage of socialism which ends with practical socialism. That is, we do those things which we believe will be of interest to the people, and we step in and take control and do the work for the people who are represented by the government. We are able to do this because we have control of the savings banks. Many years ago some far sighted people in Australia decided that the banks should be under the control of the government. The result of that is that out of a population of five million people in Australia, and I say that it is thus in no other country in the world, we have 1,000,900 savings bank depositors. The average deposit of those people is thirty-eight pounds of our money. That is the average deposit, equal to roughly \$190 each. That means an accumulation of \$376,000,000 in the savings banks of Australia, on which the government guarantees to the depositors three per cent interest.

Now, that may seem low, but we want it to be low, because we know that that money has got to be used by people who have got to get the last penny of value out of it. We lend that to the farmers at five per cent. We allow them to pay five and a half per cent. if they want to, and we wipe it off after thirty years by paying the interest only. You could not do that in any country unless you had control of all this money. Now,

this means that all these private interests, all the private institutions which are there and lending money to the people, cannot charge a great deal more than five per cent., otherwise the farmer goes to the government and gets it, and he gets it at five per cent.

Another thing we do with this money, which we have accumulated. If three of us wish to buy land, and it is the property of a large land owner, we have to go into partnership to make the application. We go to the government and tell them we want government assistance to do that. The government sends along one of its valuers from the government savings bank to have a look at the land, and if the price is right the government buys and pays for the land, and sells it to us on thirty-two-and one half year's terms. We only have to pay five per cent deposit, and the government attends to the rest. Of course they have got good security, because if we don't continue to pay our five per cent every year, they take it back. But the fact is that this land is never taken back by the government. People that have those small payments to make, and can get on to the land right away, make a success in nineteen hundred cases out of nineteen hundred and one. Those are a few things which we do to assist the people on the land. If you go into an irrigation district to buy land, the government asks you for a deposit of six per cent. All you have got to do is to pay six per cent per year, a sort of rent, for your irrigation land, and at the end of thirty-one and one half years the land is yours, and the only charge you have in addition to that is the water you actually use. If you use an acre-foot a year, you pay for that; and if you use eighteen inches you pay for eighteen inches and so on. (Applause).

Let me tell you another thing about people who occupy farm lands in Australia. We have no land taxes there, except the taxes for municipal purposes. The land taxes for municipal purposes must be based on the unimproved value of the land. If you buy land worth \$15 an acre, and by your energy and your work you make that land worth \$100 an acre, you only pay taxation on the \$15, which is the unimproved value of the land. (Applause).

We have another land tax in Australia for defence purposes, but, taking into consideration the fact that the small land owner there is always there ready to defend his country, it shall not be a charge on any individual who has less than \$25,000 worth of land. For the other people, we say, "You have a right to pay for the defence of Australia for the privilege of owning the greater part of it." That is how we treat our people.

Dealing with irrigation generally, we have only two possibilities in regard to irrigation. We have only one river basin which is a big one, and that is called the Murray and Darling

Basin. This is 415,000 square miles in extent, and it is some basin. When I was Minister of Lands in my province, I had an investigation made and I found that if we used all the water that flows into that tremendous basin, down to the sea, through that tremendous country, we would only have enough water to properly irrigate about three per cent of that great basin, and that is about 12,000 square miles. Although 12,000 square miles divided between two provinces is a pretty good area of irrigation land, it is a very infinitesimal portion of the area which will be worked by dry-farming. By a combination, however, of the two systems, we can bring into use for agricultural and pastoral purposes the great area of 415,000 square miles, roughly contained within three provinces, but the greater part of it within two provinces of our Union.

We have to use this water for pasture and for dairying. At the present time our dairying industry is conducted on land with a great rain-fall. That is the rain-fall of the first class dairying district. The whole of that industry depends on one grass called *paspalum*. About twenty years ago there was an old German farmer living in one of these districts who said to a neighbour of his, "There is a grass that I know of which is grown in Peru which would be good here." Eventually he got the government to send over for some of this grass, and planted it in and around the rivers, and that has simply revolutionized that industry. It is quite a common thing for farmers in that district to milk fifty cows all the year round, on forty acres of ground. That statement can be borne out by any information which you get from our country. Of course there are conditions under which that grass grows, which will not permit it to grow in any country, but what is called a wet sub-tropical district. But I want to show what we have to do to increase the area of our dairying industry by working under irrigation systems.

There must not be any frost and there must be a rain-fall of at least forty inches a year or this grass will not grow. But we can go right into the tropics, which extend from latitude 10 south of the equator to latitude 45, and when you get there, you are out of Australia altogether, which is equivalent to saying, that you can go into tropical countries and make marketable butter up to the 17th degree south latitude. We make it in Queensland, which is six degrees inside of the tropics. We compete with the Danish butter in London, and get good prices for it. That is what we have been able to do with the assistance of this grass, but the people of Australia are so satisfied with the dairying industries that we have to come over here to see what you are doing. We are satisfied, though, that with irrigation we will be able to obtain our fields of alfalfa, and we are going to try and do as well on alfalfa as we have been able to do on *paspalum*.

Having regard to wheat or grain growing, there is no thought in Australia of growing grain by irrigation, at the present time. I don't say it is not possible or feasible, or I don't say it is not a good thing to do, but as I told you just now, every bushel of grain that we grow in Australia, we have got to give one-fifth of it to the shipper and the agent and the other people who come between the farmer and the consumer, and it is not worth our while when we can produce butter, mutton and wool under such favourable conditions. I believe that in Australia we have the biggest butter factory in the world. I want to tell you that one factory alone produced last year twenty-two million pounds of butter or eleven thousand tons of butter, and in doing that, they killed 50,000 hogs as a by-product of the butter factory. There is another fact, though, that that butter factory is owned and controlled by the farmers who supply the milk. (Applause).

In Australia we have built up our dairying industry on the principle of co-operation. Every one has a share, and what he does not get in prices for his milk supplied, he gets month by month when the dividends are declared. Now, these farmers built this because they could not get a capitalist to build a factory. These people own that product from the time they squeeze it out of the cow till it is shipped and on the way to London. If we get twenty-five cents a pound on the London market for our butter, we are doing jolly well. If we can get ten cents of our money—that is twenty cents in Australia—it is a very good price for butter. My wife tells me that if she has to pay more than twenty cents for butter, it is a luxury. It is a luxury all the time as far as I know in this country.

Now, gentlemen, I think I have told you sufficient about our country to make you think it is not the worst country on the face of God's earth anyway, and although we have a socialistic form of government, we have a system that provides for the ordinary working man of the community, that he shall get the largest returns for his industry. We say that the man who does the work should receive the money for it. When I was a working man myself, I was a carpenter and many times I had to make all sorts of things that a carpenter can make. Now, when I was working at my trade, I could go out into the bush and cut down the timber for what I was to make, and fashion it into a table, and when I had finished that table it was mine. It was mine because I made it by my own energy with the assistance of the material that God has given us. What we say is that every man in Australia who is a producer of any description, the full result of his own energy has a right to be his. (Applause.)

I hope that this is not my last privilege of addressing an Irrigation Congress. I hope that I have given you a few facts

which may interest you and I hope that I have given out a few suggestions that will have the effect of altering the legislation of your community to make it more beneficial to the common hard-working man. If I have done so, I have not wasted my time. (Applause).

PRESIDENT YOUNG. I have had the pleasure of hearing Mr. Nielsen before and I knew we were going to have a fine talk. It has always been a matter of amazement to me and some others that so much original and benevolent legislation should have originated away over there on the other side of the world. It seems to me that scientists should attempt to discover the microbe of statesmanship which has lead to the making of such laws.

I desire to draw your attention to the interesting meeting this evening. There is music and illustrated talks and a short address by the Hon Price Ellison. I incidentally draw your attention to the fact that Dr. J. G. Rutherford is on the programme for the first address for to-morrow morning's session. Now, we are not in the habit of getting here very early or very promptly at the appointed time and I feel at liberty to state, in the language of the United States, that Dr. Rutherford "is a rattling good talker," and it would be very wise for all of us to be here on time.

The session at this point adjourned until 8 P. M., the evening of the 7th day of October, 1914.

EIGHTH SESSION

WEDNESDAY, OCTOBER 7, 1914

8.00 o'clock p. m.

The Congress was called to order by President Young.

PRESIDENT YOUNG: The meeting will kindly be in order, Mr. Dennis having an announcement to make.

MR. J. S. DENNIS: Mr. President, Ladies and Gentlemen: Particularly the Ladies and Gentlemen of the choir. I am asked by the Board of Control to extend an invitation to the members of the choir, who under very adverse circumstances have attended rehearsals here, and also our opening meeting Monday night under weather conditions which were adverse, to attend a supper tended on behalf of the Board of Control, at the Palliser Hotel to-morrow night at 10 o'clock, after the conclusion of the programme. (Applause).

PRESIDENT YOUNG: Mr. Miller, secretary of the Board of Control has some announcements to make.

SECRETARY MILLER: Let me request the delegates, who have not turned in their railway certificates to do so without delay, so that they may be validated, and you will be able to return home when you wish to do so. Some delegates have asked about the time limits on tickets. I wish to give this information. Delegates coming from points in Canada west of Port Arthur may leave Calgary up to and including October 13th. Delegates from points in Canada east of Port Arthur may leave Calgary up to and including October 24th, to reach their destination by October 31st. Delegates from the United States are given until October 24th to get to their boundary line. There is a special announcement regarding delegates who wish to go to Banff before returning home. We have arranged with the Canadian Pacific Railway Company for a rate of \$4.40 from Calgary to Banff and return, if a party of ten or more signify their intention of visiting Banff. Those who intend to visit Banff should kindly hand in their names to headquarters.

PRESIDENT YOUNG: We will begin our exercises this evening with music by the special Irrigation Congress Chorus, Mr Max Weil, Conductor. There are four numbers in the opening exercises in the following order; first, "God Save the King;" second, "The Maple Leaf Forever;" third, "Russian National Anthem;" and fourth "La Marseillaise."

These numbers were then sung by the Chorus, each selection being heartily applauded.

PRESIDENT YOUNG: Our first address this evening will be by Mr. H. P. Muckleston, of Alberta, the assistant chief engineer of the Department of Natural Resources of the Canadian Pacific Railway Company. His subject will be "Irrigation Enterprises of the Canadian Pacific Railway Company in Alberta." (Applause.)

Address by

H. B. Muckleston

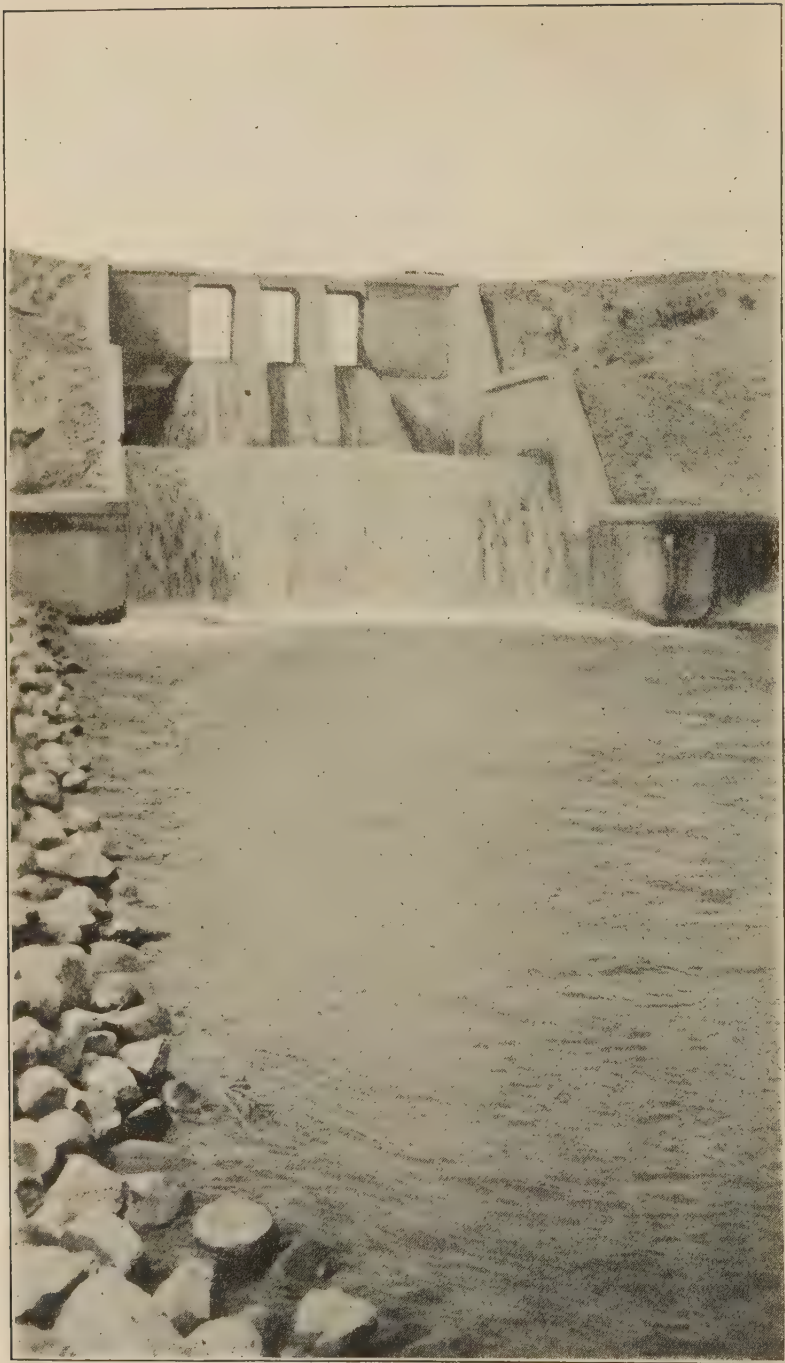
Assistant Chief Engineer Department of Natural Resources,
Canadian Pacific Railway

IRRIGATION ENTERPRISES OF THE CANADIAN PACIFIC RAIL- WAY COMPANY IN ALBERTA

Mr. Chairman, Delegates to the Congress, and Ladies and Gentlemen:

I feel a little diffidence in getting up before an audience as large as this. If I had known when I consented to make this address before the Congress that I was going to speak to half the city of Calgary, I might have taken a different idea. I wish before I start on the form of paper which I have prepared to apologize for the fact that the address is given by me, and not by my immediate superior Mr. Dawson. Mr. Dawson has, unfortunately, been a victim of one of the thousand ills that mankind is heir to, and owing to the sickness which has afflicted him for a good many months he is not able to be here to-night. If he were, I am sure that he would have prepared a much more interesting story than I have, and he would have been able to tell it in a much more interesting way.

Irrigation as a factor in the development of Canada is not a new thing by any means, although it is only within the last decade that it has attracted any very wide attention. For this attention the enterprise of the Canadian Pacific Railway is in large measure due. The development of the art in this country has followed the same programme as it did in the states south of the line. At first we had the pioneer who took the water where he found it and applied it where he wanted to with very little regard to engineering experience, and none at all to the law. Later on as settlement increased the consequences of having no legal basis began to be apparent in threatened suits at law, and as a result of this a comprehensive irrigation law was enacted early enough to avoid the wholesale litigation which has been such a prominent and regrettable feature in the irrigated states. Subsequent to the passing of the Act the second or community stage in development began. As usual at this stage of progress enthusiasm was not always



18 FOOT CONTROLLED FALL.

tempered by judgment, and many reckless and unwarranted schemes were undertaken which afterwards failed as might have been expected, and these experiences resulted in a recoil of opinion which eventually brought on the third stage, which is the period of corporation development.

In addition to determining and fixing firmly the question of right to water, the Act created the machinery for its enforcement and part of the duties of the administering officer was the survey of the country to determine its resources in land and water. These surveys revealed the existence of four large tracts of land which could be served by large projects, and in the course of time all four either have been provided with canal systems or else the systems are now in course of construction. Three of these are now controlled by the C. P. R., and it is to these that I propose to devote my address.

When the C. P. R. was constructed a part of the consideration was a land grant of 25,000,000 acres in the three provinces now known as Manitoba, Saskatchewan and Alberta. The land was to be given in alternate sections twenty-four miles on each side of the main line, and the Company had the privilege of rejecting any land which was not reasonably fit for agriculture, making up the deficiency elsewhere. Under this clause of the agreement the Company declined to accept a large area between Calgary and Moosejaw. When the time came for final settlement there was still a large area wanting to complete the grant, and the Company agreed to take some 3,000,000 acres in a solid block between Calgary and Medicine Hat.

This block covered two of the four areas which the government had surveyed for irrigation development, and, after further surveys, the Company undertook to build the necessary canal systems. In making this decision the underlying motive was not the immediate profit from the building of the irrigation enterprise, but the ultimate development of a paying traffic in a region which had up to that time produced very little and seemed to promise very little in the future unless assisted by irrigation. The block is divided into three sections, Eastern, Central and Western, for two of which—Eastern and Western—systems have been built.

Later on the Company acquired control of a project in the neighbourhood of Lethbridge, which had been built by the Alberta Railway and Irrigation Company.

The three projects now under the control of the C. P. R. are examples of the progress in irrigation development and of the great change in sentiment towards it which has taken place in the last fifteen years.

The A. R. and I. project was the first successful corporation development in the province. The standard of construction which was then adopted was that in general use throughout the corresponding states south of the line. Timber was

almost entirely used for the structures, and every expedient which would cheapen first cost was adopted even though the subsequent maintenance charge might suffer.

The Western Section of the C. P. R. block was the next large project to be undertaken, and in its earlier stages followed much the same rules as the A. R. and I. As construction proceeded the change in cost of materials, the rapidly rising cost of labour, and more than all the increase in value of the water right, produced their results and in consequence the standards of construction were gradually raised until in the units last built they are, comparatively speaking, very high. Permanent structures of concrete have taken the place of timber, and far more attention has been paid to alignment and profile than was justified in the earlier stages.

Finally, when the Eastern Section came to be built it was constructed throughout to the same high standard as the projects built by the U. S. Reclamation Service.

The three C. P. R. schemes offer a wide variety of choice, in extent, altitude, soil, and all the other features which make up a project.

The A. R. and I. project covers about 100,000 acres. It lies at an altitude varying from 3853.80 to 2958.8 feet above sea level. The soil is almost invariably a chocolate sandy loam overlying a clay sub-soil of great depth. The topography is in general fairly flat with just sufficient slope to make irrigation feasible. It is fairly well drained by natural channels.

The Western Section covers about 300,000 acres of an altitude varying from 3300 to 2750 feet above sea level. The soil varies greatly from a deep heavy clay loam almost black to a light sandy loam without much colour at all. The sub-soil is generally clay, but there are considerable areas where sand or gravel sub-soils are found. The topography also varies; the western part of the Section is a rolling foothill country having many high non-irrigable plateaus surrounded by fairly steep slopes on which irrigation is possible and profitable. Towards the east the country flattens out, the features become less prominent, and the slopes become less steep. The whole section is very well drained by nature, though there are some land-locked areas of large size where the ultimate drainage had to be provided artificially.

The last project to be developed by the Company was the Eastern Section of the block. As one of the features of this Congress is to be an excursion to the headworks of this project, I propose to describe it in more detail than the others, so that when you visit the works on Friday you will realize what is behind the large expenditure which they quite evidently represent.

If you will examine the small maps which have been handed round, you will notice index figures in circles indicating the various points in the system which will be mentioned in the description. I will first ask you to note on the map some heavy broken lines. These lines represent the watersheds or heights of land from which water would run both ways into the drainage channels. One of these is somewhat more prominently marked than the others, and this represents the main divide between the Bow river on the south and the Red Deer on the north. If we were to take a straight line from south-west to north-east at right angles to the main divide and cutting both rivers, we should find that the point where it cut



MEASURING WEIR AND FARM LATERAL.

the Red Deer river is several hundred feet lower than the point where it cuts the Bow, and we would also find that near the divide the land which sloped towards the Red Deer was very much steeper than that which sloped to the Bow, and that near the rivers the reverse is the case. Due to this combination of circumstances we should find that if a canal were cut from the Bow river through the divide the lower end of this canal would be high enough and far enough away from the Red Deer river to command quite a large area of land, so that the first problem in providing an irrigation system was to cut through the divide from the Bow river to the other side of the watershed, where the waters of the Bow could do useful work in the service of agriculture instead of loafing away to the ocean.

This looks simple enough, but except at the one point where the constructed system heads, it would not be econom-

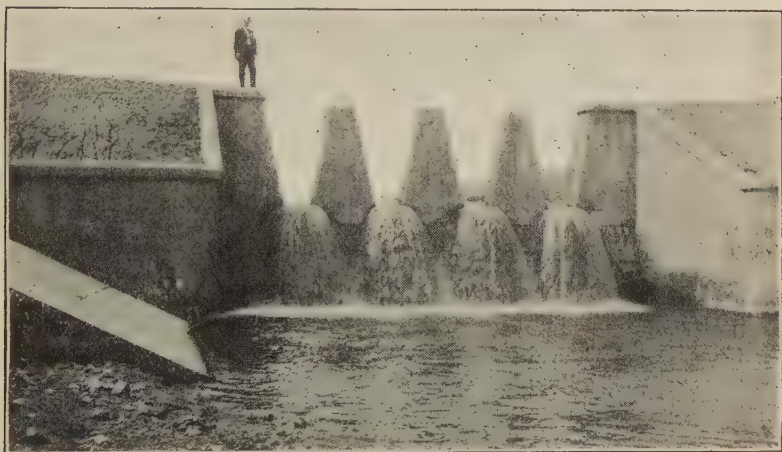
ically possible to do this owing to the tremendous cost of the cutting which would be required. But at the Horseshoe Bend of the Bow river, nature evidently anticipated the intentions of the C. P. R. and made things very much easier. If you look at the maps again, at the extreme western corner, you will see that the main divide is here quite close to the Bow river—as a matter of fact, it is only 600 feet away and only 90 feet higher. This point is the summit of a deep valley which cuts square across the country from one river to the other, sloping very rapidly to the Bow and comparatively slowly to the Red Deer. However, even here a canal ninety feet deep and five miles long would be required, which from a cost standpoint would be an impossible undertaking, while on the other hand to raise the level of the river ninety feet by a dam would be equally impossible. So a compromise was adopted whereby the level of the river was raised fifty feet by a dam, and the watershed lowered sixty feet by a cutting, which incidentally provided the material required to build the earthen portion of the dam. In this way the problem was solved at the minimum of expense.

The dam which has been built at this point deserved to rank among notable structures of its kind in the world. It is notable because of its composite character; its great length; its peculiar foundations; and, by no means least, because of the very great depth of water which will flow over its crest during the periodical floods to which the Bow is subject. The dam is 7,900 feet long and 60 feet maximum height, and consists of two parts. One is an earth embankment 7,180 feet long, the other a reinforced concrete overfall dam 720 feet long.

At the site of the dam the river formerly made a wide sweeping curve shaped like a horseshoe. Across the heels of the shoe the distance is about half a mile, while measured round by the river the distance is about three miles. The concrete portion is built in the original river channel, just to the right of the toe, and the earthen occupies the tongue of land inside the horseshoe. Except for its unusually liberal dimensions the earthen part of the dam is not specially remarkable. It is paved with concrete slabs to prevent wave wash and erosion, and the top has a heavy curved parapet wall to keep the waves from dashing over in bad storms.

However, if the earthen dam is not very unusual, the concrete spillway is remarkable in many ways. In the first place, while it looks solid from the outside, it is really hollow, as those who visit it to-morrow will see. In the second place, it is not built on a rock foundation but on clay. In the third place, whereas most masonry dams depend entirely on their weight, to hold them in place against the pressure of the water, this type of dam derives the most of its stability from the very pressure which tends to shove it out of place.

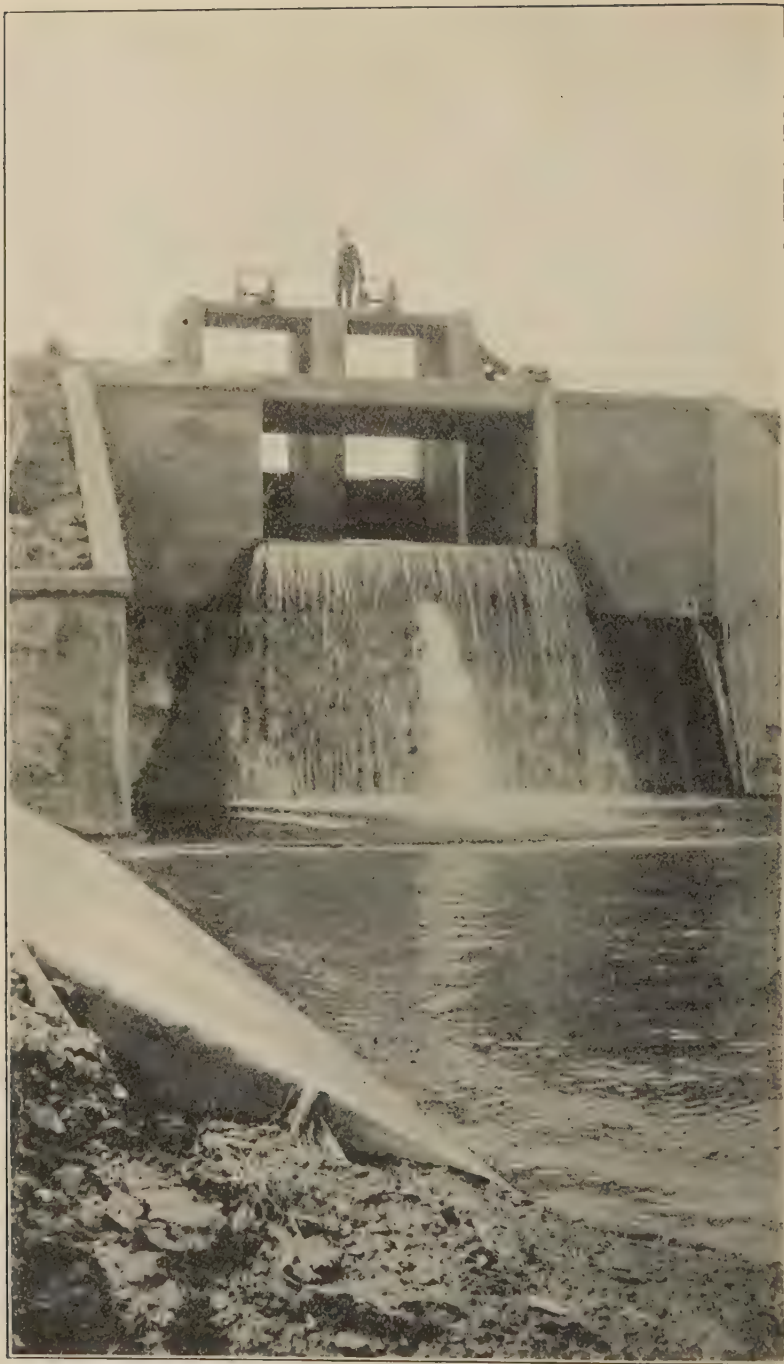
The first step in construction was to lay down on the bed of the river a heavy concrete floor about one hundred feet wide and extending clear across the river and some distance into each bank. On this floor there were next erected a series of piers or buttresses, triangular in outline, the upstream face sloping about 40° from the horizontal, and the downstream face somewhat steeper. These buttresses were braced to each other to keep them upright, and thick reinforced concrete slabs were then placed across the openings between the buttresses. The dam is therefore a hollow three-cornered box stiffened by triangular partitions. On top of the dam there are a series of piers with massive steel sluice gates working between them by which the level of the pool and the flow over the structure can be governed.



OPEN NOTCH FALL— $7\frac{1}{2}$ FEET.

The intake structure is built as an integral part of the spillway and has five steel sluices like those on the dam for the purpose of regulating the volume of water entering the canal.

The canal cutting is 2.5 miles in length, and at its eastern end discharges its waters into the valley mentioned, down which it runs for about 2.5 miles further, where it is stopped by a small dam, marked No. 1 on the map, and where it divides into two branches, marked No. 2 and No. 3 and called the north and east branches respectively. The north branch runs off to the Red Deer river, into which it finally tails out. It waters about 80,000 acres, part of which is already settled and producing results. It has several structures of interest, among which may be mentioned an 18 ft. concrete drop, another of 35 ft. and a flume 2,000 feet long and 25 feet high.



COMBINE HEADGATE AND FALL.

The east branch flows south-east along the northern slope of the divide reaching the watershed again at the Antelope Creek Valley (No. 5). This canal does not directly irrigate very much land, its principal function being to supply water to other branch systems, and to fill the large internal storage reservoir (No. 8), which has been christened Lake Newell, in honour of a man whom probably all of you know.

The first of the branch canals supplied by the east branch is the Spring Hill canal, which is marked No. 4. This canal waters some 120,000 acres of land, all of which is north of the C. P. R. main line. These are several large concrete drops and a flume 3,000 feet long on this canal, which can be seen from the railway line.



FIFTY FEET CONCRETE RAPID.

It is a marked topographical peculiarity of the country which is bounded by the two rivers that it is cut across at frequent intervals by wide and deep depressions or valleys, which usually drain both ways from a summit. One of them has been mentioned as utilized for the main canal. A second occurs as the valley of Antelope creek (No. 5). When the east branch reached this point, it had gained so much elevation on the general eastward slope of the country that it had attained the divide and it was here possible to take off a branch on to the Bow river slope (No. 6). The summit of this valley is lower than the canal and in order to cross it without losing command, either a high flume or a siphon was required. For many reasons a siphon was preferable at this point, and accordingly the canal crosses the valley in a reinforced concrete siphon having five barrels each five feet in diameter, and half a mile long.

The Bow slope canal skirts the ridge along its south slope throwing off numerous small branches as it goes and finally spills any surplus water into the reservoir. It irrigates about 40,000 acres altogether. There are no remarkable structures on it.

After leaving the Antelope valley the east branch goes on round the north slope of the ridge and after throwing off a small branch at Cassils, which crosses the track by a concrete siphon 4 feet diameter, discharges into the reservoir through a long concrete chute.

The structures on the east branch, apart from the siphon, are remarkable chiefly on account of their size. There is one flume 54 feet wide and 100 feet long, another 1,000 feet long, and a large number of very heavy steel highway bridges. This canal is intended to be operated through the winter months, and this fact influenced the design materially.

The reservoir is a very important factor in the whole canal system. In the first place, by its development just where it is, it ensures that the extreme lower ends of the system can be opened in the spring about two weeks earlier than would be possible without it. Secondly, it simplifies the operation of the east branch by acting as a balancing pool. Thirdly since it is to be filled during the winter months when the canal is not required for irrigation, it enables the entire east branch to be materially reduced in size and cost.

The reservoir occupies a deep depression lying to the west of a range of hills. Its development involved building nineteen earth dams large and small with an aggregate length of about five miles, and when full it will have a surface area of 16,000 acres; will be nine miles long, four wide and sixty-eight feet deep; and its stored waters would cover 100,000 acres to a depth of very nearly two feet.

There are two outlets from the reservoir (Nos. 9 and 10,) controlled by massive concrete structures with steel sluices like those at the intake. The outlet at the south end feeds the Rolling Hills canal, which waters an area of about 70,000 acres. The first few miles of this canal ran through a stretch of exceedingly rough country, and its construction involved some very intricate problems in location and unusually heavy earthwork for a canal of its size. There are also some large levees or fills used instead of flumes owing to the distance over which timber would have to be transported from the track.

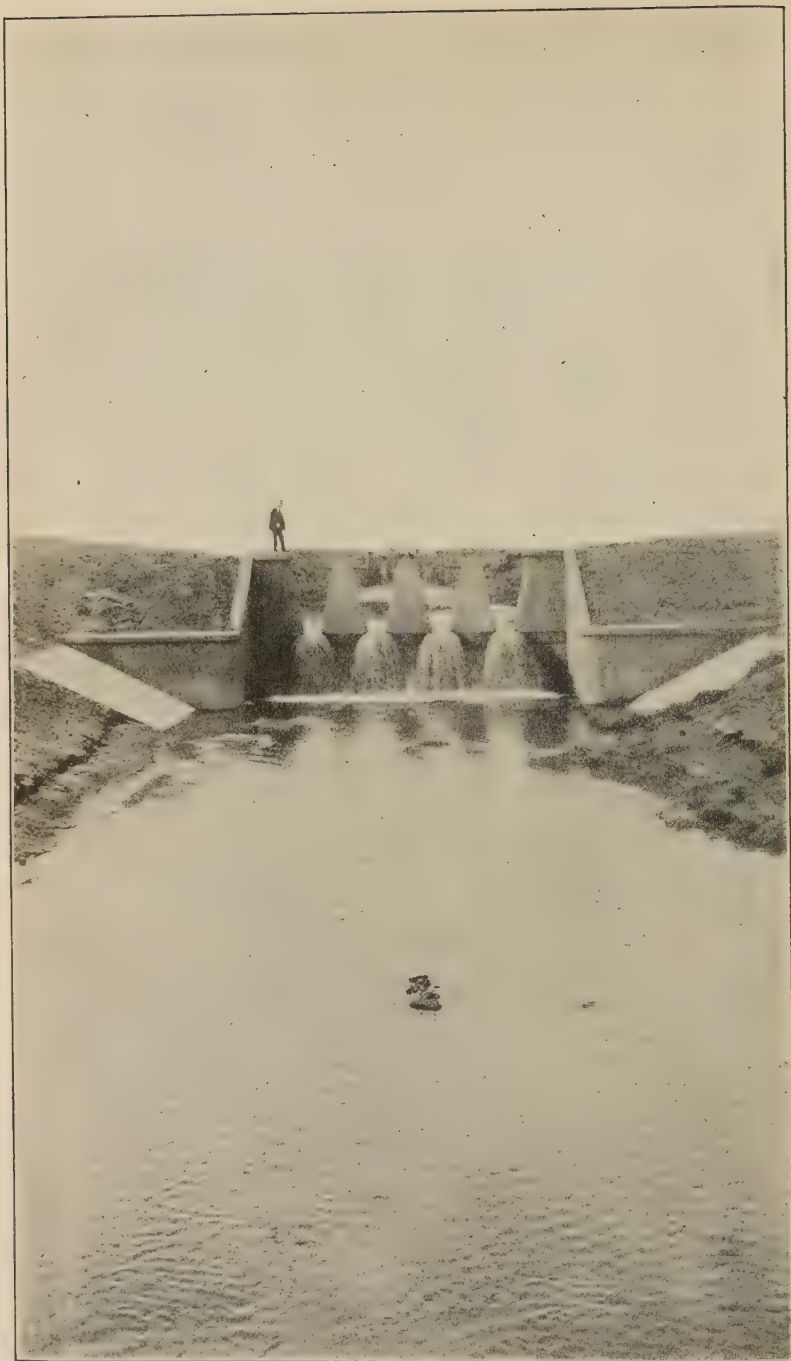
The outlet at the north end supplies the Bantry canal system, which irrigates 120,000 acres. About four miles from the reservoir this canal comes to another of the cross valleys mentioned before, and here was met the toughest engineering problem encountered in the design of the whole system. It was required to convey 900 cubic feet of water per second, or 330,000 gallons per minute, across a valley two miles wide and

sixty feet deep, crossing the main line of railroad on the way, and do it with as little expense as possible, coupled with the least loss of elevation. The solution of the problem has resulted in a structure which has no parallel on this continent, or anywhere else.

In cases of this kind there is always the choice between a flume and a siphon, and the designer can properly decide only after a careful analysis of all the conditions and circumstances. When there is plenty of head available, especially if the depth of the valley is comparatively great, a siphon is usually the cheaper in the long run though not necessarily so in the first cost. But when the available head is restricted a siphon frequently involves either a single pipe so large that it is impracticable or else a number of smaller pipes are required which not only runs up the cost very rapidly, but also involves a prohibitive loss of head, and consequently a flume is usually preferable provided the valley is not too deep.

Owing to the size and importance of this crossing it was desired to take no chances with fire, and for reasons of durability a reinforced concrete structure was preferred over steel if it could be had within reasonable cost, so designs were worked out using this material. Most flumes are rectangular if built of wood, and semi-circular if built of iron or steel, in the latter case being suspended from girders instead of supported by them. In designing this flume the suspended steel flume was taken as a model, but instead of using semi-circular section, which is convenient but incorrect, the proper section was chosen, i.e., the same section as it would assume if it were made of a flexible material like canvas instead of a rigid material like steel or concrete. Distortion of a semi-circular steel flume under load does no particular harm because the material can stand it, but with a concrete shell excessive distortion would certainly result in cracks, so the shell was given the correct shape in the first place. The water channel is 21 feet wide on top, 8.7 feet deep at the centre. The concrete shell is only five inches thick. The under part or sub-structure which supports the actual water channel is also of concrete and consists of a series of braced towers twenty feet apart, carrying reinforced concrete girders from which in turn the concrete shell is suspended.

The problem was complicated by the existence of the main line of the C. P. R., which crosses the aqueduct diagonally near the eastern end. The track is too high to admit of taking the flume over this railway, so it had to go beneath, and is accordingly taken under the railway by a concrete pipe nine feet in diameter. The total fall in the two miles of flume is a little better than four feet, which gives a velocity of nearly eight feet per second or about six miles per hour.



FLIGHT OF CONCRETE DROPS.

At the east end of the aqueduct the canal begins again and branches out to water an area of about 120,000 acres. There is nothing very extraordinary about the canals, a levee three miles long and eight feet high being the only notable feature. Part of the country served was originally very poorly provided by nature with drainage channels and it was necessary to dig artificial ones, nearly a million yards being handled for this purpose alone.

The number of structures built in connection with the canal systems runs into the thousands, and in constructing them the best practice in design has been followed.

On the large arteries where there is no probability of change in location, permanent construction, i. e., concrete and steel, has been used throughout except in some of the larger flumes and the highway bridges. On the smaller ditches, i. e. those whose location depends somewhat on the way land is sold and is subject to change, too permanent construction is not wise when the systems are first built, and consequently timber has been used at first, to be replaced by permanent work when settlement is complete and definite enough to warrant it.

In designing these thousands of structures the engineers took full advantage of experience elsewhere, especially the U. S. Reclamation Service and the great canals of India and Egypt. So far as possible the best precedents have been followed and an earnest effort made to avoid and profit by mistakes of others and to improve when improvement was possible. No expense has been spared to secure safety and efficiency, and while it is certain that mistakes have been made, it is confidently hoped that they are few in number and of minor importance in the whole scheme.

The topography of the Eastern Section is extremely favourable to economical construction. There are very few miles of canal which have no irrigable land immediately below them. The surface slopes are moderate, making the ultimate distribution of water on the land comparatively easy. The soil is very varied so that the settler who wants a particular kind will have no difficulty in finding it.

The altitude varies from 2,550 feet at the western edge to 2,300 at the eastern.

To give some idea of the size of this system, I may state that its construction involved the moving of over 20,000,000 cubic yards of excavation. The structures required 110,000 cubic yards of concrete and 6,000,000 pounds of steel, while nearly 10,000,000 feet of timber were required for the flumes, bridges, and small structures. The total mileage of canals and ditches is over three thousand five hundred.

The system which I have tried to describe to you is now practically completed, and the engineers who built it have

given place to the colonizers whose task it is to settle it. The first colony of settlers have now been on the land for about seven months and the showing which these colonists have made in that short time is sufficient proof that the artificial application of water to the land, provided it is done with intelligence and industry, is sure to be attended with success and it indicates that the expectations which the Company had in constructing the system will be fully met.

I thank you, Mr. President, Ladies and Gentlemen.
(Applause).

PRESIDENT YOUNG: The delegates to the Congress are all quite aware that, through the courtesy of the Canadian Pacific Railway Company, we are to be permitted or to be given a complimentary opportunity of overlooking its stupendous irrigation enterprise which has just been so graphically described.

The next item on the programme is the Belgium National Anthem, by special request, by the Irrigation Choir.

The Choir then sang "La Brabanconme". (Applause)

PRESIDENT YOUNG: I have the honour of introducing to you the Hon. Price Ellison, the Minister of Agriculture for British Columbia, who will address us. (Applause).

Address by

The Hon. Price Ellison

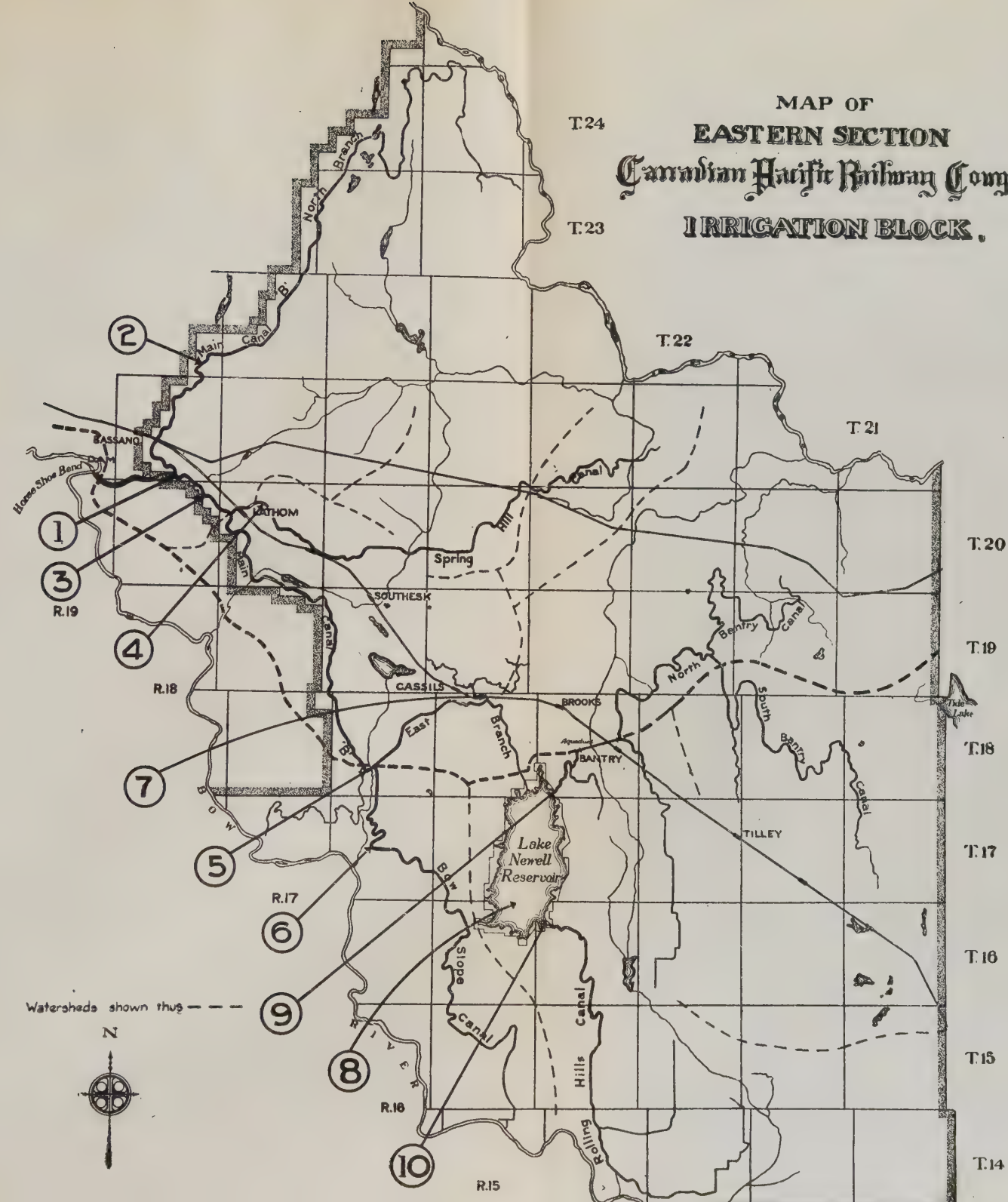
Minister of Finance and Agriculture, Province of British Columbia

Mr. President, Delegates, Ladies and Gentlemen:

I suppose I will have to shout; but I am able to do it. I want to tell you simply how glad I am to see all the people, our cousins from across the line, come so far for this Convention. It seems to me that they are here, not out of idle curiosity, but that they may learn, and that is just what I came for,—not to make a speech. I was not intending to speak at all, but Mr. Dennis insisted I should say a few words, because I came from the dry belt of British Columbia. I am not an engineer or one of the scientific men, but I am a man who made ditches with the shovel and have done it for thirty years, in order to put water on the land. (Applause). That has been my experience.

I want to tell you in a few words—in as few words as I possibly can—of the great benefits of irrigation in the Okanagan Valley, and what it has done for my section of the country. Some years ago the people of the Okanagan Valley were agitating for the government to subsidize a line of railway, from Sicamous Junction, on the main line of the Can-

MAP OF
EASTERN SECTION
Canadian Pacific Railway Company.
IRRIGATION BLOCK.



Watersheds shown thus - - -



adian Pacific to Okanagan Lake, a distance of fifty-one miles. The government of the day sent out an engineer to report on the amount of arable land, to find out whether it would justify the building of the said line. The report was favourable and the road was built by a company, and an agreement was entered into with the Canadian Pacific Railway to lease the line for twenty-five years and pay the government 40% of the gross earnings to meet the interest on the bonds, which the earnings for a great many years fell short of doing. The opponents of the government made political capital out of it, saying that it was a bad bargain and the road would never pay, and for that reason the government ought to be put out of power.

I want to tell you that within a very few years it began to pay a little more until the time came, about three years ago, when the Okanagan district paid the entire interest on the bonds, and this was solely on account of a few large irrigation companies putting water on the land. I went on a freight train the other day from Sicamous Junction into the valley, and that freight train was over a quarter of a mile long of empty cars. The lovely fruit you see in the back of this hall is from the irrigated lands in that particular district. Now that is something, and nothing more wonderful than that except the Canadian Pacific Railway saw fit just two years ago to refund all the money the government had paid, and that was the line which was said would ruin the country. The same thing was said when the Canadian Pacific Railway was built, that it would ruin Canada.

There is nothing that made Canada a nation more than the Canadian Pacific Railway from the Atlantic to the Pacific, and again, just look what it is doing in the matter of irrigation, spending millions of dollars in Alberta alone. When I look at the exhibits at the rear of this hall, which came from the irrigated lands of Alberta, I really think they are unsurpassed in any place, and it is simply wonderful to me. Notwithstanding the very heavy snowstorm of the other day, that is the greatest blessing this country could have. Of course this may seem strange; but as a practical man I know it is just what is required. God always takes care of His own and these are God's own people. I have only to speak five minutes and what I have to say would take a week in order to tell you of my experiences in regard to the benefits of irrigation.

I am glad to have had this opportunity of speaking to you. Before going back to your homes you certainly ought not to do so without going to the Pacific Coast by the Canadian Pacific Railway to Vancouver and Victoria, and if you will call on me or any of my colleagues, they will only be too glad to see you and reciprocate in any way possible the great kindness you have shown. (Applause.)

PRESIDENT YOUNG: The Chorus will now render, first the "Red, White and Blue;" second, "The Minstrel Boy;" third, "Hearts of Oak"; and fourth, "March of the men of Harlech", with Mr. Horace Reynolds, soloist.

These selections by the choir were received with enthusiastic applause.

The Chorus then sang "O Canada." (Applause).

PRESIDENT YOUNG: Mr. McKellican the Chairman of the Board of Judges of the District Exhibits in the adjoining hall, or in the other end of this hall, will now make the prize reports and our evening's entertainment or meeting will conclude with an illustrated lecture on "Storage and Power Possibilities of the Bow river west of Calgary," by M. C. Hendry, engineer of the Dominion Water Power Branch. Mr. McKellican of the Board of Judges: (Applause).

Report of

THE BOARD OF JUDGES

ANNOUNCEMENT OF PRIZE WINNERS

Mr. President, Delegates, Ladies and Gentlemen:

In bringing before you the report of the Judges of the Exhibits, I wish first to express the appreciation of the Judges of the magnificent exhibits upon which we have had to place the awards.

They are a great credit to the exhibitors who have put them up, and I am sure I am right in the opinion of the public as well as of the Judges in making that statement. Those of you who have not yet seen the exhibits should not fail to visit them, not only in this building, but in the annex to the rear. They are well worth a visit.

The first class to be reported on is that displayed by government or corporation. The combined exhibit of the Canadian Pacific Railway Company and British Columbia Government gets the award. I am sure you will all agree with me that this is a magnificent exhibit that has won this award, and that it could have won in much keener competition.

Now, coming to the district exhibits, in which the competition was keenest, I must say that the Judges had a great deal of difficulty in arriving at a conclusion. The Judges for this work were chosen to represent the four Western Provinces and the United States, one from each one of the four Western Provinces and one from the United States. In judging the exhibits we drove a score card, allowing half of the points for the matter or the material contained in the exhibits and half for the method. The fifty points, which were given

for the material which made up the exhibits, were divided into five heads, and each Judge was given one of those classes. All four Judges, or five Judges, worked together on the general display. Now, when we totalled up our points, we found that three districts had secured within three-quarters of a point of the same in the three highest scores. When this was disclosed—the exhibits were representing three different provinces—the four Canadian Judges requested the one American Judge to break the tie, as it were to go out and go over the exhibits again and to place them, consequently that is how the decision has been arrived at.

I will now give you the order in which we have placed the awards. The \$500.00 first prize for district exhibits goes to the Revelstoke Agricultural Society, of Revelstoke, British Columbia; the second prize goes to North Battleford Board of Trade, North Battleford, Saskatchewan; the third prize goes to Kelwell, Manitoba; the fourth prize goes to Carstairs, Alberta; the fifth prize to Cardston, Alberta; the sixth to Olds, Alberta; the seventh to Acme, Alberta; the eighth to Swalwell; the ninth to Didsbury, Alberta.

Now, the individual exhibits, I shall not take time to give you as they will appear in the press and you will be able to find out from there how they went.*

I am requested by the exhibition committee to announce to the exhibitors that their cheques are ready for them and that by applying to the manager, in the press room, they can get their money right now. (Applause).

PRESIDENT YOUNG: The Hon. Price Ellison and Mr. Dennis have a very important announcement to make to the meeting.

THE HON. PRICE ELLISON: Ladies and Gentlemen: I am very delighted indeed to know that in conjunction with the C. P. R. the British Columbia Government have been awarded the first prize. We have exhibited with the C. P. R. before in Chicago, and we find that they are good people to work with. On behalf of the Government of British Columbia, and considering the prize is not bought—it was to be a trophy—I propose to hand over the money to the Canadian Patriotic Fund. (Applause.)

MR. DENNIS: Ladies and Gentlemen: On behalf of the Canadian Pacific Railway Company, I have very much pleasure in saying that we will only be too pleased to follow the lead of the British Columbia Government and contribute our share of this trophy to the Patriotic Fund. (Applause).

PRESIDENT: Mr. Hendry, Ladies and Gentlemen: (Applause).

*The complete prize list will be found in the appendix to this volume.

Address by

M. C. Hendry

Engineer of Dominion Water Power Branch

**POWER AND STORAGE POSSIBILITIES OF THE BOW RIVER
WEST OF CALGARY**

Mr. President, Delegates, Ladies and Gentlemen:

In presenting a paper to this Congress this evening, I would explain that when the Board of Control requested the Dominion Water Power Branch to have a paper presented before this Congress, it was decided that Lieutenant-Colonel C. H. Mitchell, C. E., who has been consulting engineer to the Branch in connection with the extensive power and storage investigations of the Bow river above Calgary, should prepare and personally present a paper on these investigations, the results of which are so intimately connected with the irrigation situation in the Province of Alberta. The present war situation has altered the situation however, for Lieutenant-Colonel Mitchell is now with the Canadian Expeditionary Forces, and at the last minute I have been called upon, as engineer in charge of the Bow river Power and Storage investigations, to take Lieutenant-Colonel Mitchell's place.

The paper which I have to present, while not dealing with irrigation, still is an application of a subject so closely allied with it, in this western country, that one may scarcely be mentioned without calling to mind the other. It deals with the possibilities of both storage and power on the Bow river west of Calgary.

The conservation of the natural resources is perhaps the most important public problem confronting the people on this continent. The necessity for preserving and protecting the physical foundations of our prosperity has been forcibly brought to public attention in every section of both the United States and Canada. No other form of governmental activity has won such instantaneous and unanimous approval among all classes of opinion as has the patriotic effort of the various conservation organizations on this continent, to further the general welfare by insisting upon the protection and proper use of our forests, minerals, land and waters, in the public interest.

Conservation of water requires its use for the present and for the future. The forecasting of the probable future needs of a region, and the consequent determination of the highest future use of its available water supply, is a difficult problem and one where many factors now unknown or unappreciated

may have important influences. Plans made for the future utilization of a water supply must involve as little sacrifice of present needs and growth as possible. Instances where there may be conflict between future development and present use must be carefully considered, harmonized where possible, and where conflict is unavoidable, preference given for the higher use. Typical Examples of such conflict are seen when it is sought to establish power plants in such a location that the subsequent use of the water for irrigation will be impracticable, or where agricultural and mineral claimants seek to acquire the lands chiefly valuable for water power or irrigation development.

There is probably no river on the American continent that offers greater possibilities of conflict in use than the Bow river in the province of Alberta. In the first place, it is one of the most attractive features of the Canadian National Park, and no regulation or storage that is attempted must desecrate the æsthetic features of this world famous resort. In the second place, it offers unusually attractive and feasible possibilities for power development in its upper waters. In the third place, its waters even now irrigate hundreds of thousands of acres of Alberta prairie. One of its main tributaries is a source of domestic water supply to the city of Calgary. At first blush it might appear almost impossible to so harmonize the various uses of these waters as to establish an ultimate comprehensive co-operative scheme which would allow of its waters being used for the various purposes mentioned. However, a thorough investigation and study of the storage and control possibilities of this river by the engineers of the Dominion Water Power Branch, has revealed that such a scheme is both possible and probable.

Where the resources of a river have been investigated by engineers of the Dominion Water Power Branch, the department is in a position to dictate a scheme of development for the entire river, based upon the information gathered, relating each individual project to the whole. The outstanding result of such policy being that the maximum power output for the river is secured.

This policy of administration has been and can be still further applied to the development of power and storage on the Bow river west of Calgary.

GENERAL CONDITIONS AND SITUATION

The conservation of the waters of the Bow river is of the utmost importance, both from the standpoint of irrigation and water power development, upon which depend the progress and growth of the agricultural and industrial communities in the Bow valley, the rapid and steady growth of each having a distinct and beneficial influence upon the other. (See Map).

The Bow river, which flows through the city of Calgary, rises on the eastern slope of the Rocky Mountains west of Calgary. The area drained above the city is about 3,140 square miles, and of this area the part lying above the Kananaskis Falls, 1,710 square miles in extent, is wholly within the Rocky Mountains Park or under Park administration. The headwaters lie at an elevation of 6,500 feet above sea level, and from there to the confluence with the Kananaskis river, at Kananaskis Falls, a distance of 90 miles the fall is 2,750 feet. Between this point and Calgary, a distance of 55 miles by river, there is an additional 720 feet fall. With two exceptions, the largest tributaries of the Bow west of Calgary join the river above Kananaskis Falls or in the mountain section. The greater part of the water therefore comes from that area, and the river has in consequence all the characteristics of flow typical of a mountain stream.

It has been estimated that the maximum flood discharge at Kananaskis Falls has reached as high as 45,000 c. f. s., while a minimum flow of less than 600 c. f. s., has been recorded at the same point. Records of the discharge at various points have been kept more or less continuously since 1909. From these a diagram has been drawn (See plate 1) showing graphically the discharge of the river as recorded at Banff, Horseshoe Falls and Calgary.

That part of the river referred to as lying within the Rocky Mountain Park, has owing to the topographical features, been considered the storage section of the river. Below the Kananaskis Falls, for a stretch of about thirty miles, the topography lends itself to power development, and has been termed therefore the power producing section of the river.

EARLY DEVELOPMENT

Prior to the spring of 1911 the only power plant in operation on the Bow river was that of the Eau Claire Lumber Company, situated within the city limits of Calgary, and operating a plant of about 600 H. P. The company has utilized the natural fall of about half a mile of the river of giving a head of twelve feet. This is obtained by a diverting dam, a pile and crib structure and a canal. The plant supplies power for lighting in the city, the water power being supplemented by a steam plant.

LATER DEVELOPMENT

The growing demand for power at Calgary resulted in the building by the Calgary Power Company of a plant on the Bow river about fifty miles west of Calgary. The growth of this city has been phenomenal. It has control of its public utilities, that is, street railway, water works, electric light, etc., so that it is, itself, in the market for power in rapidly increasing amounts. There are other large users of power, including the Canadian Pacific Railway Company. Construction was commenced in

1909, the plant being designed for an ultimate output of 15,900 H. P. Owing to the great variation in the flow of the river this cannot be considered as being continuous output, for when the plant was placed in operation in the spring of 1911, it was realized that the minimum flow was much less than anticipated. (See plate II).

NECESSITY FOR INVESTIGATIONS

The rapidly increasing demand for power in the vicinity of Calgary and the necessity for providing adequate storage and regulation facilities for existing and contemplated plants on the river demanded immediate and vigorous action by the Dominion Water Power Branch, to ascertain the power and regulation possibilities of the river, and formulate a policy to provide for the maximum possible realization of the resources of the river in the best interest of present and prospective users, both for power and irrigation.

A thorough investigation of the Bow river and its tributaries west of Calgary was commenced in the spring of 1911, under the immediate direction of the speaker, with the advice and assistance of Mr. C. H. Mitchell, C. E., one of the Board of Consulting Engineers to the Dominion Water Power Branch. In the report which has been prepared and published on the results of this work Mr. Mitchell has collaborated.

Most of the stream gauging work accomplished in the district, covered only the open water periods, little data as to the flow under winter conditions being available, so the establishment of additional stations and the extending of the records were arranged for with the Irrigation Branch, Department of the Interior. The work as instituted in 1911 was carried out and completed during the following summer and the winter of 1912-13.

RECONNAISSANCE

A thorough reconnaissance of the entire river basin was made by the speaker and Mr. C. H. Mitchell. The different creeks and lakes examined were either eliminated as being unsuitable for power or storage purposes, or accepted as feasible and some general scheme for development settled upon. In the latter case a field party was then put on the ground to carry out the investigations in greater or less detail.

SURVEYS

During the summer seasons of 1911 and 1912, detailed topographical surveys were made covering about thirty miles of the Bow river, from the C.P.R. bridge above Kananaskis Falls, down as far as Radnor; particular attention being given to the several possible power sites. Topographical surveys were also made of Bow lake, Lake Minnewanka and outlet and the basin of the Spray lakes, having in mind the creation of storage.

POWER SITES

There are six possible power sites on the Bow river below Kananaskis Falls, as follows:—

- | | | |
|----|------------------------|----------------|
| 1. | Kananaskis Falls site. | developed. |
| 2. | Horshoe Falls | “ developed. |
| 3. | Bow Fort | “ undeveloped. |
| 4. | Mission | “ “ |
| 5. | Ghost | “ “ |
| 6. | Radnor | “ “ |

Two other possibilities have been proven feasible in this basin, one of about 900 H. P. capacity on the Cascade river, immediately below the outlet of Lake Minnewanka, where the Calgary Power Company has constructed a storage dam, and another on the Kananaskis river, just above the C. P. R. bridge where a combined storage and power development has been proposed.

STORAGE POSSIBILITIES

The storage possibilities of the basin are indeed extensive and important, although the question of flow during winter conditions from the possible storage reservoirs must be further considered before any comprehensive construction scheme is finally determined.

A full report of these investigations is given in Water Resources Paper No. 2, of the Dominion Water Power Branch from which the tables and plates, and all information herein, have been taken.* Results of the surveys are briefly summarized in Tables Nos. 1 and 2 as follows:—

TABLE No. 1. STORAGE BASINS.

BASIN	CAPACITY	
Bow Lake	27,400	Acre Ft.
Spray Lake	171,000	“ “
Lake Minnewanka	44,700	“ “
“ “ auxiliary	14,200	“ “ } Created
Total above Calgary on Bow River	242,100	“ “
“ “ with auxiliary	257,300	“ “
Elbow River	23,000	“ “
Total above Calgary, including auxiliary at Minnewanka	280,300	“ “

*All investigations by the Dominion Water Power Branch of the water resources of the Western Provinces are published in the Annual Reports of the Department of the Interior. Those of particular importance, or of considerable magnitude, are briefly summarized in the Annual Reports, but published in full as separate water resources papers. These reports are available to interested parties upon application to the Superintendent, Ottawa.

BOW RIVER

Diagram shewing Mean Monthly Discharge from Jan. 1908 to Dec. 1912

AT
CALGARY, HORSESHOE FALLS, AND BANFF

To accompany report on Power and Storage Investigation

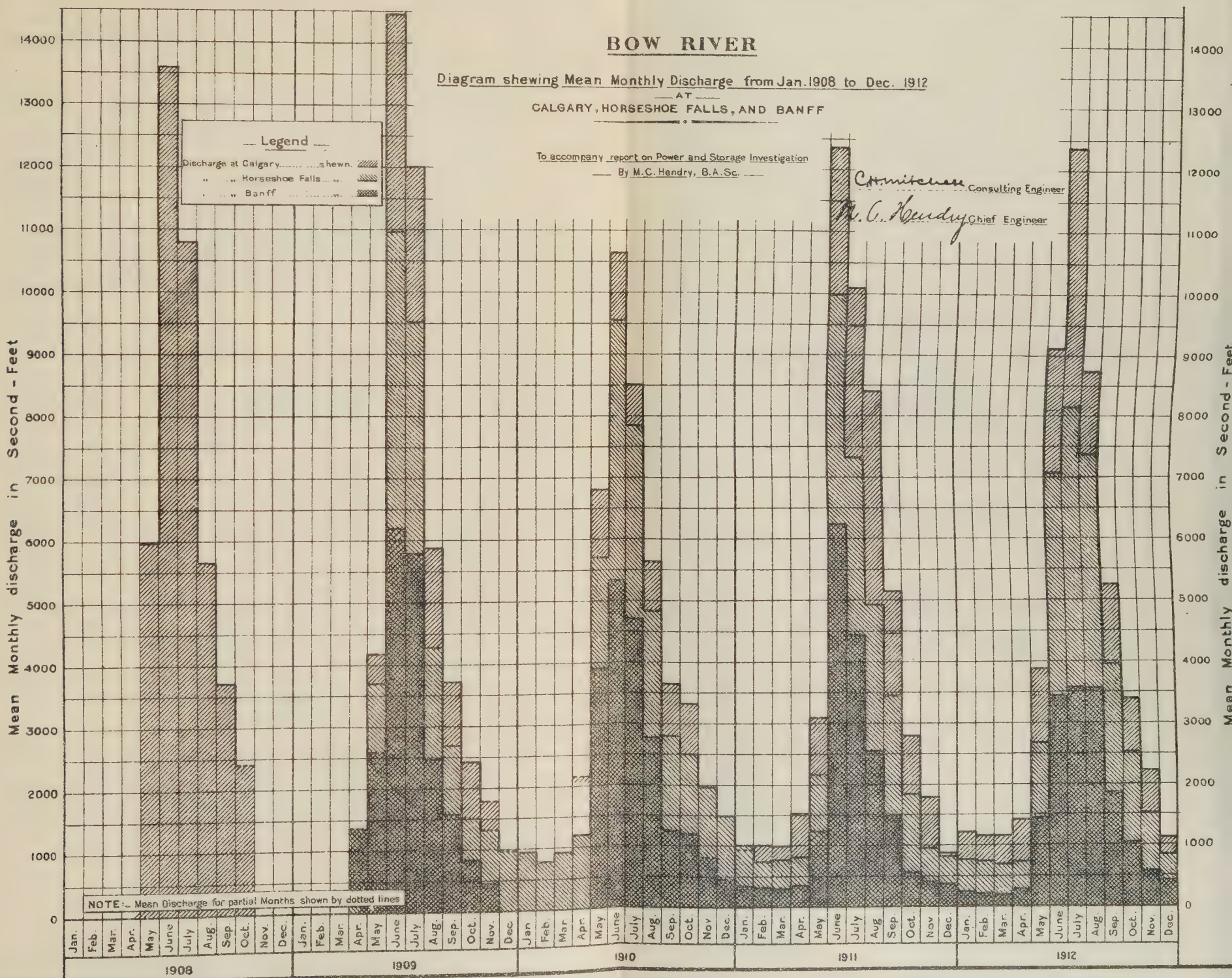
By M.C. Hendry, B.A.Sc.

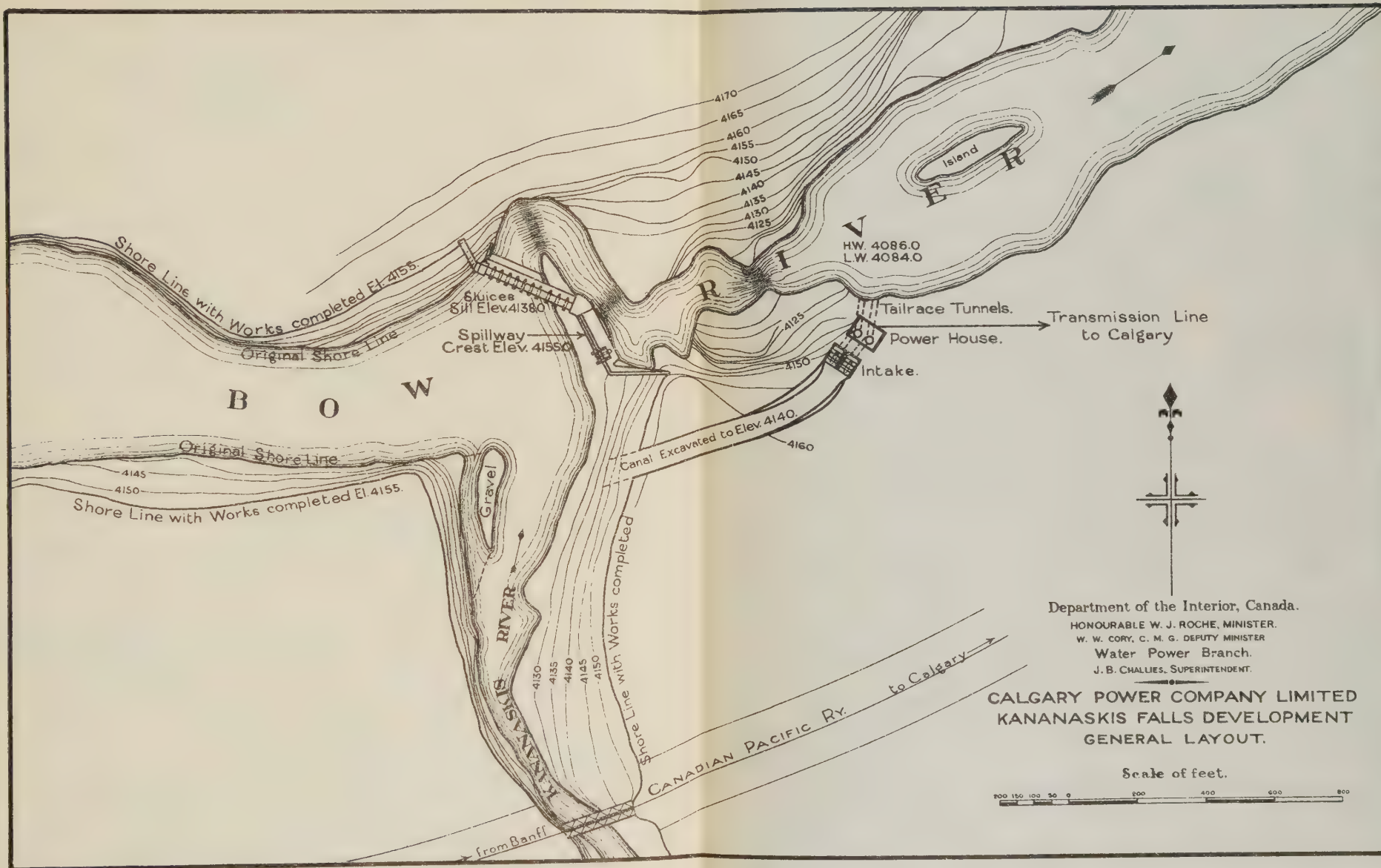
C. Mitchell Consulting Engineer

M.C. Hendry Chief Engineer

Legend
Discharge at Calgary.....shewn.
" " Horseshoe Falls.....
" " Banff.....

NOTE: Mean Discharge for partial Months shown by dotted lines

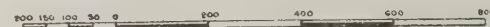




Department of the Interior, Canada.
 HONOURABLE W. J. ROCHE, MINISTER.
 W. W. CORY, C. M. G. DEPUTY MINISTER
 Water Power Branch.
 J. B. CHALLIES, SUPERINTENDENT.

CALGARY POWER COMPANY LIMITED
 KANANASKIS FALLS DEVELOPMENT
 GENERAL LAYOUT.

Scale of feet.



BOW RIVER

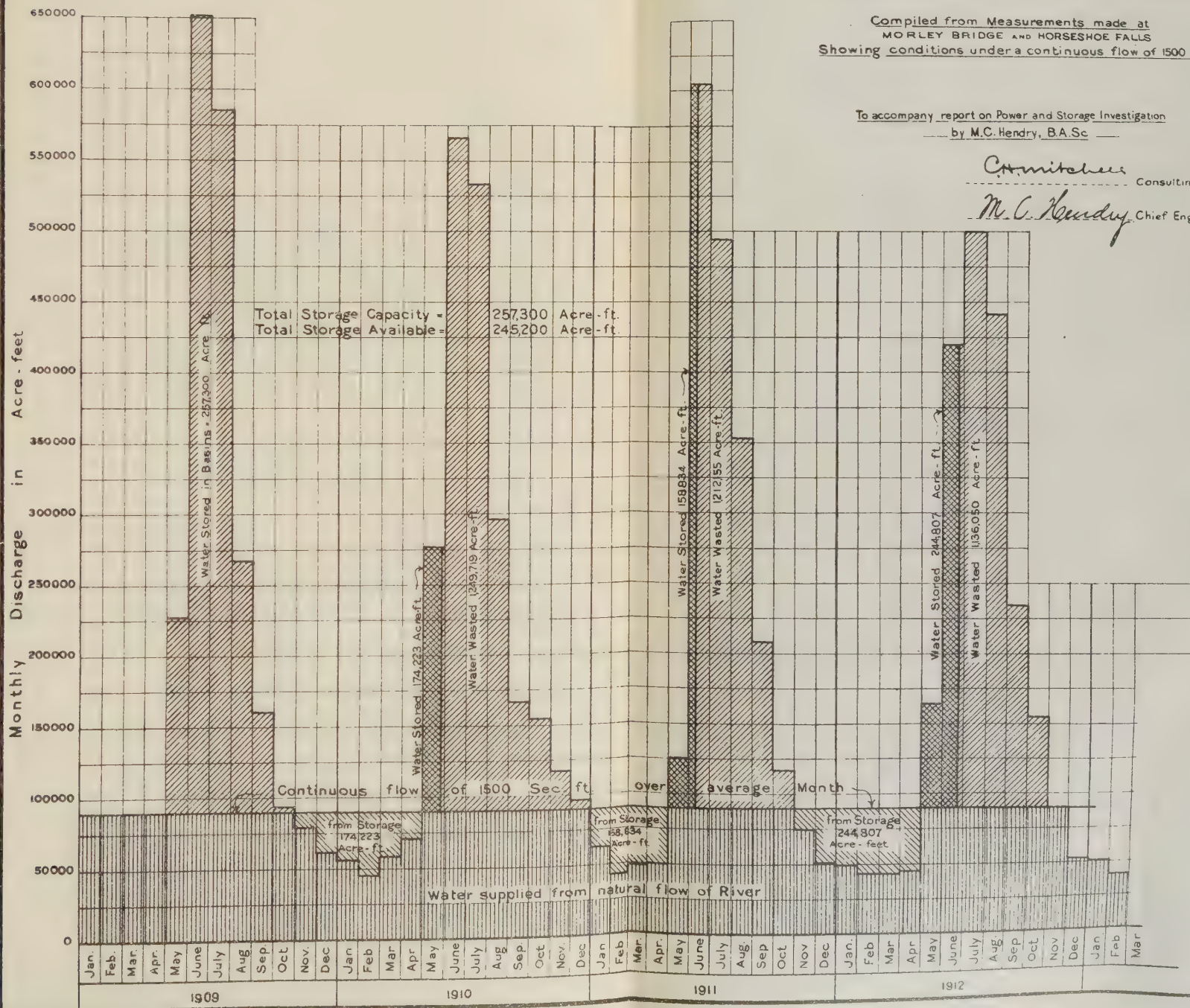
— AT —
HORSESHOE FALLS

Diagram of Discharge in Acre-ft. from Jan. 1909 to Feb. 1913

Compiled from Measurements made at
MORLEY BRIDGE AND HORSESHOE FALLS
Showing conditions under a continuous flow of 1500 Sec. ft.

To accompany report on Power and Storage Investigation
by M.C. Hendry, B.A.Sc.

C. Mitchell Consulting Engineer
M.C. Hendry Chief Engineer



BOW RIVER

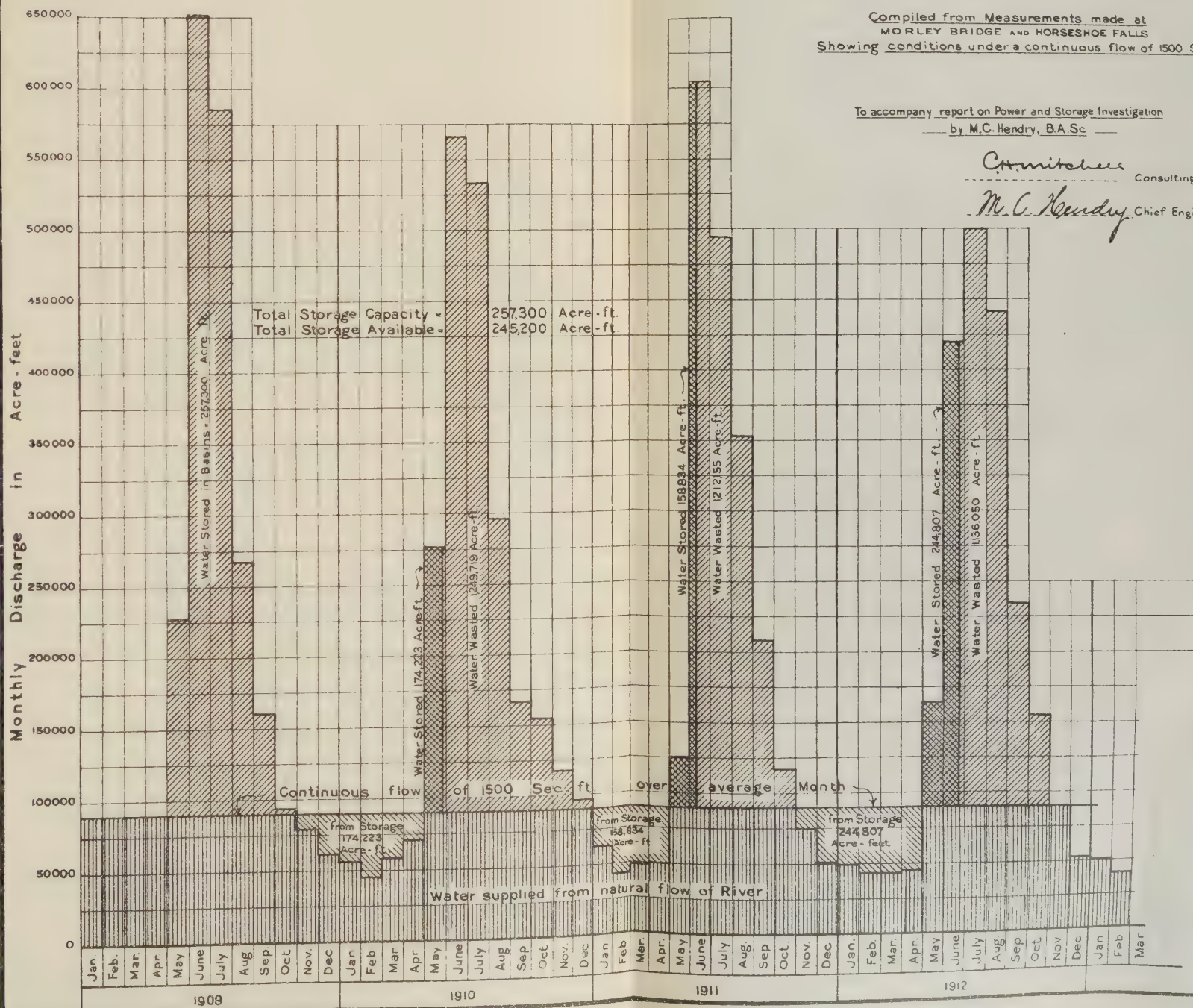
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Committee
Consulting Engineer
M.C. Hendry Chief Engineer



BOW RIVER

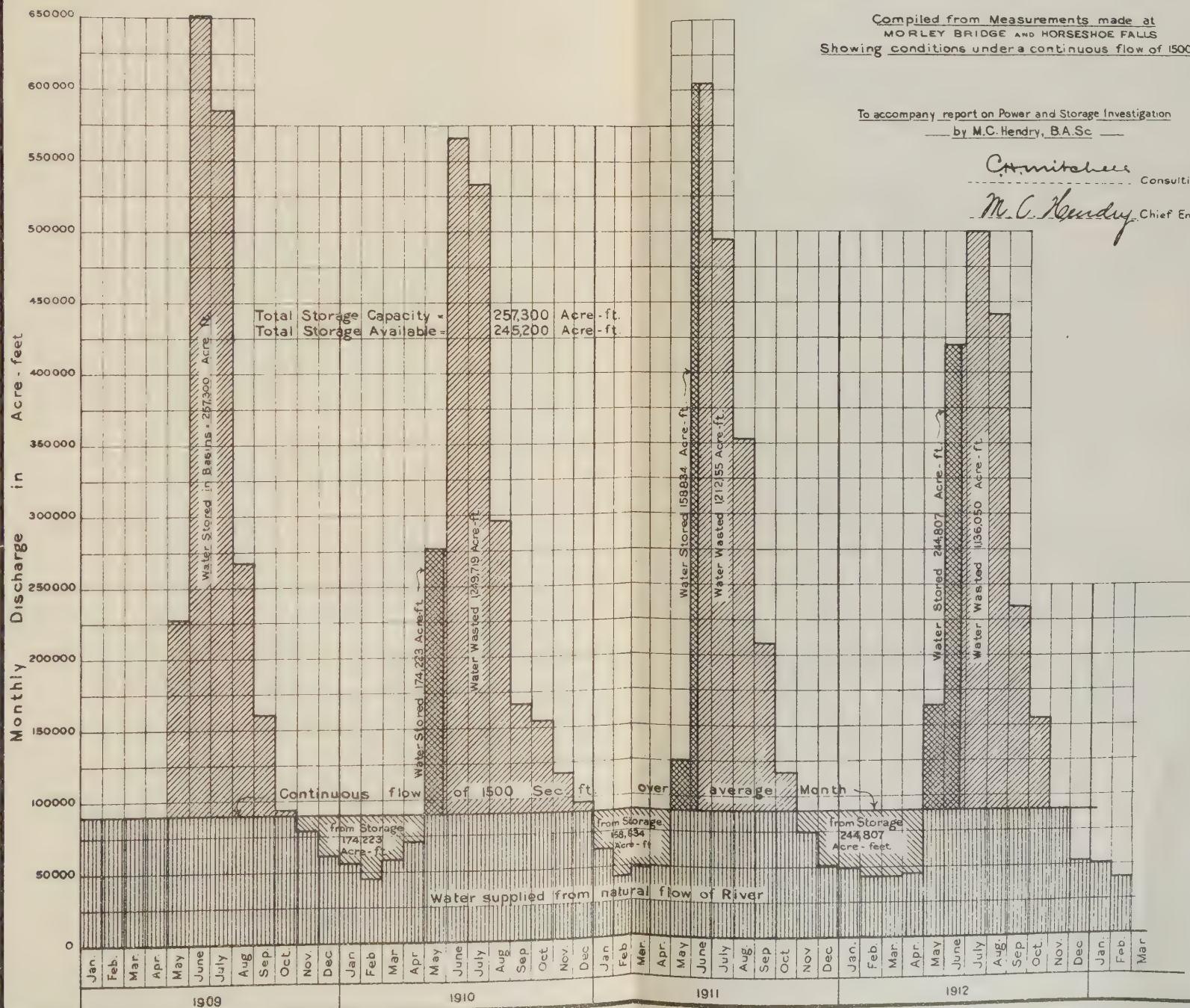
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BOW RIVER

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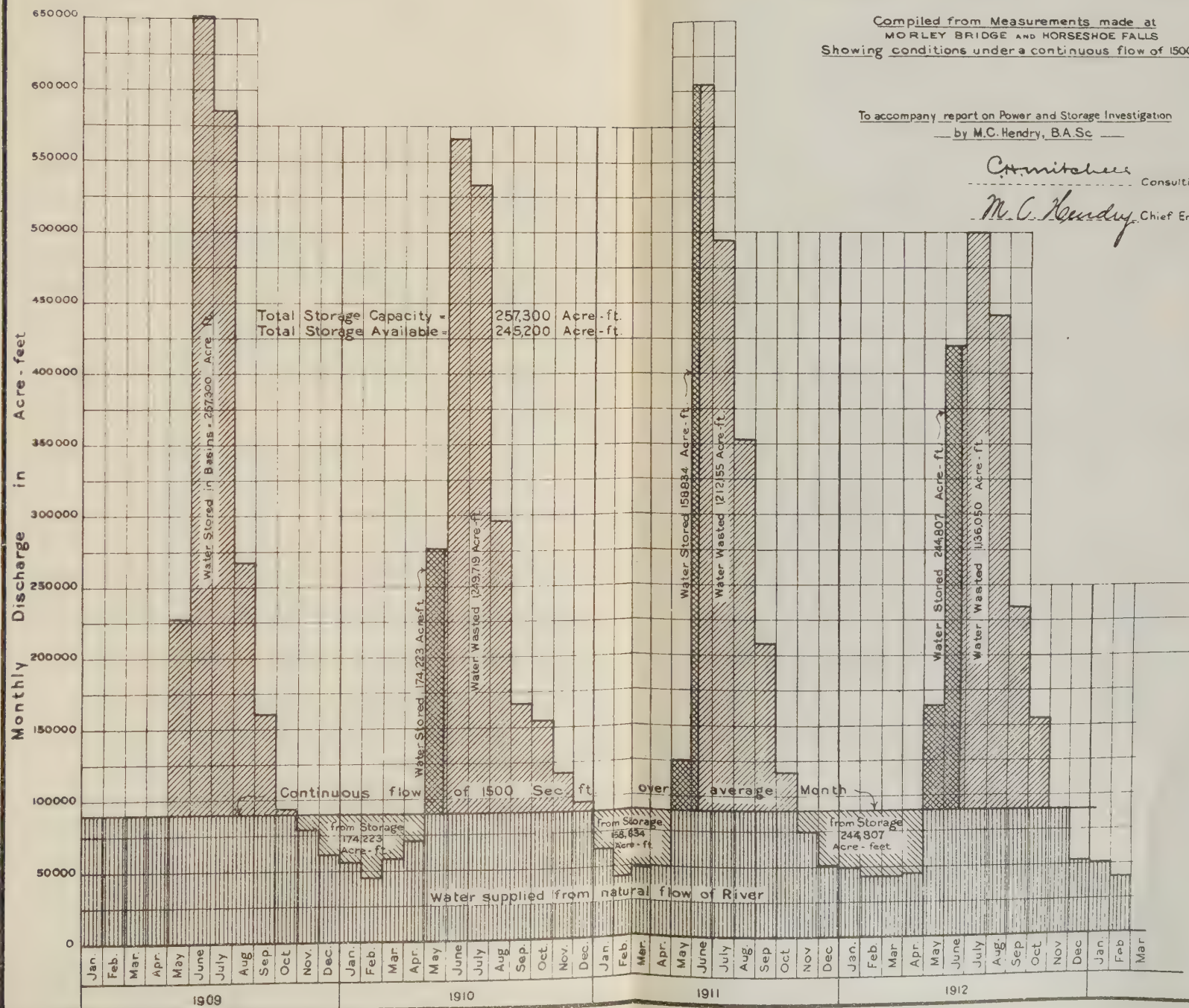
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BOW RIVER

— AT —
HORSESHOE FALLS

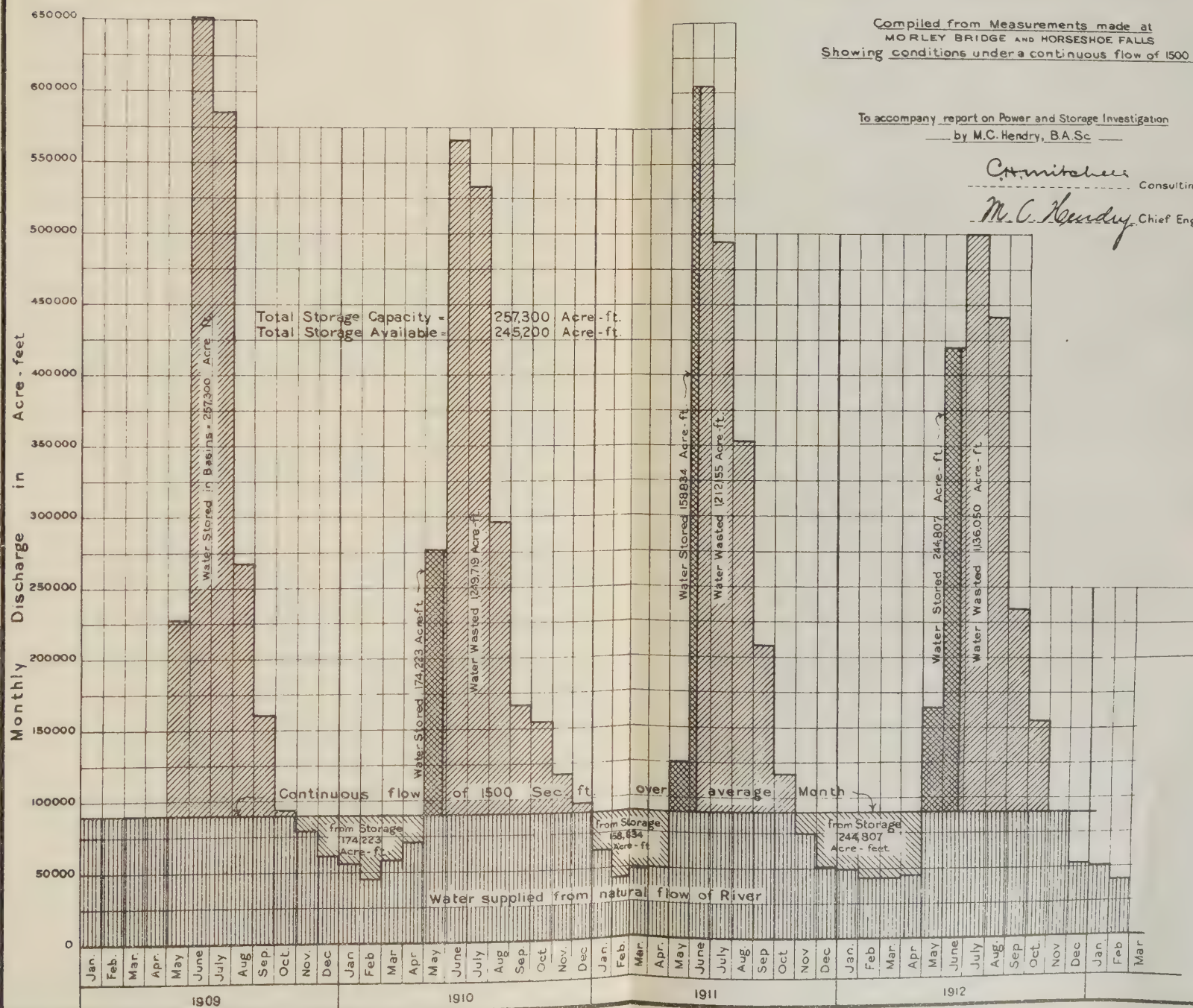
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M.C. Hendry Chief Engineer



BENEFITS OF STORAGE

All possible storage on the Bow river above Calgary is fortunately available for the whole power reach of the river between Kananaskis Falls and Radnor. The mean flow for the low winter months, as recorded at Horseshoe Falls, has been found to be as low as 720 c. f. s., and the minimum flow as low as 500 c. f. s. By reason of the storage that has been and may be created, it is anticipated that the mean flow can be raised to at least 1500 c. f. s. Below the mouth of the Ghost this would be increased to 1,600 c. f. s.

The effect of storage upon the power output of the river over that due to the natural flow is shown in table 2.

TABLE No. 2, SHOWING EFFECT OF REGULATION AT EACH POWER SITE ON BOW RIVER.

POWER SITE	CONTINUOUS WHEEL H. P.		
	Head	Natural Flow	Regulated Flow
Kananaskis Falls (Developed).....	70	3820	9545
Horseshoe " ".....	70	3820	9545
Bow Fort.....	66	3600	9000
Mission.....	47	2565	6410
Ghost.....	50	3180	7275
Radnor.....	44	2800	6400
Totals.....		19,785	48,175

Department power site at Minnewanka Dam, Cascade River... 1,165 W.H.P.

Grand total of power capacity of river fully regulated 49,340 W.H.P.

Giving an increased continuous output of..... 29,555

A diagram showing the continued effect of the storage upon the flow of the river at Horseshoe Falls has been prepared (See Plate No III). This is based upon a storage capacity of 257,300 acre ft., and after allowing for loss, it is considered that 245,200 acre ft. will be available for augmenting the minimum flow; the diagram is based upon the mean monthly flows, and is for the period of 1909-12. It shows the effect of storage upon the discharge of the Bow river at Kananaskis Falls for the low water seasons of 1909-10, 1910-11 and 1911-12. From the diagram, it will be seen that at the lowest season a discharge of 1,500 sec. ft. can be secured.

In preparing the diagram, the effect obtained from storage was taken as that due to the discharge of 160,000 acre ft. from the proposed Spray basin of 27,000 ft. from

the proposed Bow Lake basin, and of 44,000 acre ft., from Lake Minnewanka basin, 12 ft. draw down of lake. In addition to this there can be made available at Minnewanka a further storage of 14,200 acre ft. using a 16 ft. draw down.

From the foregoing it seems reasonably certain that a flow of 1500 sec. ft. can be maintained: during seasons of unusually low water this may possibly not be realized, and records over a longer period would give more weight to the conclusions drawn, but in the absence of more certain information this flow has been accepted as reasonably certain, and it is this discharge upon which the developments between Horseshoe Falls and Ghost river have been based.

Below the mouth of the Ghost these figures are increased.

From the data available it seems reasonable to expect a minimum flow of 100 cubic feet per second during the low water period from this river, so that the minimum regulated flow should be increased to 1600 c. f. s. for points below the mouth of that river.

Below Calgary and including the regulated flow of the Elbow, a flow of nearly 2,000 c. f. s., may be expected during the low water period. (See Plate IV.)

EFFECT OF STORAGE ON POWER OUTPUT

In addition to the foregoing, a curve has been prepared (See Plate No. V.), showing the effect of the total available storage in the basin (developed and undeveloped) upon the producing power of the river. The curve is known as a "Power Percentage of Time Curve." The period for which it is plotted is from May 1909 to April 1912, embracing practically all the records available. The ordinates of the curve represent Wheel Horse Power, and the abscissae, Time in percentages, 100% being the period given above. Two curves are plotted, one in a full line being that derived from the natural flow during the period, and the broken line that from the regulated flow.

The diagram (Plate No. V.) has curves for both the Horseshoe Falls and Kananaskis Falls plants; the curve derived from the natural flow of the river being that due to a head of 70 ft. and at 80% efficiency.

For the Kananaskis Falls plant the output in an average year from the natural flow of the river would be, for the turbine installation, 8,101 H. P. years. With the proposed regulated flow this could be increased by 1,863 H. P. years, giving a total annual output of 9,964 H. P. years (See Plate VI).

For the Horseshoe Falls plant the same curve applies, the head and regulated flow being the same. Here however, the turbine installation is greater, being 19,500 H. P. From the curve it will be seen that the total annual output, due to the natural flow, would be 12,087 H. P. years, to which may be

added, due to stream regulation, 2,171 H. P. years, giving the total annual output of 14,258 H. P. years.

A profile of the power producing stretch of the river is shown on Plate No. VII. This plate demonstrates the inter-relation of the head and tail waters of the different plants, and of the proposed concentrations.

ESTIMATES OF COST

Estimates of cost have been prepared providing for a complete development of the three proposed storage basins, including the one already built at the outlet of Lake Minnewanka, four additional power plants on the power producing stretch of the river, and include duplicate transmission lines sufficient to carry the total output from the four additional plants to Calgary, together with adequate receiving equipment at Calgary.

While these estimates are, of course, of a very preliminary nature, and are merely for the purpose of obtaining a comparison of costs, and arriving at a reasonable conclusion as to the commercial possibilities of the whole conservation project, including the construction of the various storage works, and of the four additional power plants, they have been conservatively computed, and are considered ample to cover all contingencies based upon existing labour and market conditions. The results of these estimates of cost are summarized in tables 3 and 4:—

TABLE No. 3, STORAGE DEVELOPMENT

SITE	Capacity Ac. Ft.	Estimated Cost	Cost per Ac. Ft.
Bow Lake	27,490	105,000	\$3.83
Spray Lake	171,400	570,000	3.33
Minnewanka	44,700	145,000	3.24
.....	58,900	145,000	2.46
Elbow River	23,000	200,000	8.70

TABLE No. 4, POWER DEVELOPMENTS

SITE	Head in Feet	Continuous Output W. H. P.	Estimated cost of plant includ- ing cost of storage.	Estimated cost including stor- age and Trans- mission Sub- stations, etc.	Estimated cost per k.w.h. of power delivered in Calgary on a 50% load factor basis.
Bow Fort. . . .	66	9000	\$924,970.00	\$1,011,370.00	0.49
Mission	47	6410	851,100.00	915,800.00	0.60
Ghost.	50	7275	892,500.00	963,530.00	0.57
Radnor	44	6400	807,460.00	869,800.00	0.59

IRRIGATION

In dealing with the question of storage and power development in this district, irrigation interests cannot be lost sight of.

Calgary, as is well known, lies on the western margin of an immense fertile tract and the full realization of its resources depends to a very great extent upon irrigation.

From time to time irrigation has been attempted in this district, from 1879 when the first scheme was put into operation on Fish creek, down to the present, when one of the largest, if not the largest undertaking in the country is being operated practically at the doors of Calgary.

With the foregoing conditions obtaining, it is well to recognize that the agricultural industry with its irrigation requirements is pre-eminent in this locality and must take precedence of all power requirements in regard to the use of water.

When the Bow river investigations were instituted there was some apprehension that possibly there might be conflict between the power and irrigation interests in the adjustment of water supply. As, however, the investigations were broadened, it was rapidly realized that the effect was rather of a co-operative nature. On the broad principle that any storage project will assist in supplying ample water for both requirements, it is obvious that there can be no interference, if the discharge is equitably controlled so as to be uniform throughout the spring and autumn.

The irrigation season extending from April 7th to September 30th., includes the three summer months having high flood discharge, May and September having discharges higher than the proposed regulated flow of 1,500 this will not be interfered with, and on the other hand the April flow will, if changed, be augmented.

Under any circumstances during the operation and control the requirements of irrigation should be kept in mind, and in face of a threatened shortage the reasonable demands of irrigation be met.

Mr. C. H. Mitchell in submitting his final recommendations to the department, following the completion of the work says.:

CONDITIONS TO BE MET

If the improvement of Bow river is undertaken for the advantage of the power and irrigation industries it is obvious that it should be done by, and remain under the control of the government, because of the many conflicting interests of water demand which would be involved. In addition to the irrigation interests, there are, or are likely to be, several power companies all requiring water in some degree of uni-

formity throughout the year. Such being the case, it is evident that once the storage system is constructed, its satisfactory operation, impartial and efficient, can be secured only through the medium of some central official body, exercising an absolute control over the water supply, so as to obtain the greatest advantage and efficiency to the largest proportion of public users. All users must be made parties to the arrangement, so as to make it comparatively co-operative.

CONCLUSION

Realizing the very important relation that the Bow river bears to every phase of development of the district through which it flows, and the urgent necessity of having a comprehensive and practical scheme worked out in detail and put into practice without delay, the investigations just described were carried out with all reasonable thoroughness and all possible despatch.

They have been surprisingly gratifying and it is safe to say that the city of Calgary occupies a very enviable position among the cities of the West, situated as it is in very close proximity to a vast district capable of being intensely developed with the aid of irrigation and having within a distance of fifty miles a number of power sites capable of developing an aggregate of 50,000 continuous horse power, such an asset is of inestimable value. (Applause).

PRESIDENT YOUNG: To-morrow will be the concluding day of the Congress and I promise you a very interesting day. We will meet to-morrow morning at 9:30 o'clock and we will speedily conclude the programme. To-morrow evening we will have but a short speech and perhaps some slides, but largely music.

The Congress will now adjourn until to-morrow morning at 9:30 o'clock.

NINTH SESSION

THURSDAY, OCTOBER 8, 1914

9.30 o'clock a. m.

The meeting was called to order by President Young.

PRESIDENT YOUNG: The Congress will kindly be in order.

The Secretary has a communication from the Governor of Texas to read.

SECRETARY HOOKER: The following is a communication which has come to hand from Hon. O. B. Colquitt, Governor of Texas.

TELEGRAM FROM GOVERNOR COLQUITT

"Austin, Texas.
October, 3, 1914.

"Hon. Richard W. Young,
President International Irrigation Congress.
Calgary, Alberta, Canada.

My dear Sir:—

I regret very much that circumstances prevent my attending the International Irrigation Congress. Very great good can be accomplished by these meetings, and I ask you to extend to the Congress my heartiest good will for a profitable and successful session.

Yours truly,
(Signed) O. B. COLQUITT.
Governor."

PRESIDENT YOUNG: State Engineer Beers of Utah informs me that he desires to make a motion.

MR. W. D. BEERS, of Utah: I see by the programme that you have the report of the Committee on Permanent Organization and the selection of the next place of meeting and the selection of officers set for 8 o'clock this evening, and I would move that, if the Committees be ready to report, that these be taken up at 2.30 o'clock.

PRESIDENT YOUNG: Following the report of the Resolutions Committee?

MR. BEERS: Yes, as we will have a number of visitors here to-night and it will be very hard to do any satisfactory business.

MR. E. F. BENSON, of Washington: I second that motion, Mr. President.

PRESIDENT YOUNG: My attention is called by the secretary to the fact that one of the items of business this evening is also the adoption of the resolutions and if you have no objection we will also incorporate that in the transfer of business from this evening to this afternoon's session.

MR. BEERS: Yes sir, I concur to that.

MR. BENSON: I concur.

PRESIDENT YOUNG: The motion is that the business of this evening relating to the report of the Committee on Permanent Organization, the selection of the next place of meeting, and the selection of officers for the coming year, also the adoption of the resolutions, be transferred from this evening's programme to that of this afternoon.

Upon being put to a vote, the motion carried.

PRESIDENT YOUNG: The motion is carried and the change will be made. That permits a change in this morning's programme which has been suggested, viz., that Dr. Rutherford be given a place on this evening's programme instead of this morning's programme, and the Chair has been very happy to accede to the request so that Dr. Rutherford will not appear on this morning's programme, but will address us to-night.

I desire to state with reference to a little incident of yesterday that possibly the Chair and some gentlemen who were then present have misunderstood each other. In the discussion which was participated in by Mr. Trego and Mr. Sorensen and others at the conclusion of the discussion I made a statement which was misconstrued apparently. My suggestion was understood as possibly a personal reference to those gentlemen, and possibly some others by way of criticism. The Chair had no such intention. I formed the impression, perhaps wrongly, no doubt wrongfully from the explanations which have been made to me, that statements were made in our presence which would indicate that agriculture, either dry-farming or under irrigation, could not successfully be carried on in Alberta, and that only one good crop could be raised in seven years. I do not know whether others were as dull as I was in getting that erroneous conception, therefore I venture to say that from all of the information that we have, Alberta is a very good place for agriculture, whether dry-farming in certain districts or irrigation in certain districts, and that I feel that the experiences of some of these gentlemen must have been entirely local and individual perhaps in some places.

I am now informed that the gentlemen putting forth these views, which I misconstrued, merely desired to make the Congress understand that under one or two projects—under one perhaps—the Gleichen project,—if I have the name correctly, the general impression and experience of the farmers was that irrigation was not necessary, that there was a sufficient rain-fall for the maturing of crops. Now that is all that these gentlemen desired to intimate, as I am informed, and they did not desire to cast any aspersions upon Alberta as an agricultural province or upon irrigation in other districts than the one which they represent. We will now proceed, gentlemen, to our morning's programme and the first item will be an address by Mr. Newman, one of the Board of Governors of this Congress, on the "Great Falls Plan of Co-operation between the City and the Farming Community."

I have pleasure in introducing Mr. Newman, gentlemen. (Applause).

Address by

L. Newman

Member Board of Governors, International Irrigation Congress

THE GREAT FALLS PLAN OF CO-OPERATION BETWEEN THE CITY AND FARMING COMMUNITY

Mr. Chairman, Delegates, Ladies and Gentlemen:

I have prepared a very short paper on the subject of co-operation between the business men and the farmers. Now I am interested in the success of all irrigation projects, particularly reclamation projects constructed by our Federal Government, and those that are located in my own section of Montana. I have directed my interest in irrigation, especially within the last few months, to assisting the farmers, the new settlers on the irrigated projects located closer to my city of Great Falls, to assisting the settlers financially and I am doing this work on the theory that the success of the farmers is inter-locked with the success of the city that is located near the irrigation project.

I mean that success and the prosperity of the farmers means the success, the growth and the prosperity of the city. This paper is very short, I have never read a paper before, as I have always taken a chance on getting through with what I had to say at the number of meetings at which I have spoken previously, but I feared that I might drift a little too long and take up too much time, so I concluded that in order to be sure I had better let the paper tell the story.

With the recent great activity throughout the arid sections of the United States and Canada in building reclamation projects and reclaiming the land to provide homes for the people, our business interests and our governments have been confronted with a large and serious problem of a new character. It may be stated substantially thus: How may the farmer on the irrigated homestead, and the business men and bankers in the adjoining town, best co-operate to mutual advantage, and to the upbuilding both of town and country? Or again, it may be stated from this angle: What method may be used to aid the struggling but deserving farmers on the irrigated farm until they are able to build up their credit at the local bank?

In order that I may not be thought presumptuous in undertaking the discussion of this subject, it may be wise for me to state that it has fallen to my lot, in my own city of Great Falls, to have considerable to do in working out a solution of this particular problem. I may suggest with a degree of modesty that we have developed the Great Falls plan for this work which we have proved to be efficient, and of which we are all duly and truly proud. All of you know, I assume, that Great Falls, Montana, geographically, is the trade centre of one of the largest irrigation projects on the continent, when it has been completed—the Milk river project,—and that the Sun river project lies at our very door, another project of almost as great magnitude as the first mentioned. In addition to these, we are reasonably near, though not the trade centre, of other large projects, as for example the Huntley and the Flathead and one or two other Indian reservation projects.

With these facts in mind, I shall approach my purpose of explaining the Great Falls plan of helping the farmer on the irrigated land, doing so effectively and yet doing it in a dignified, business fashion that helps to instil a courage and determination in the farmer himself, that makes him a better citizen, a more successful agriculturalist, and a happier individual.

In my subsequent remarks I desire to be understood as referring to irrigation projects finished under government direction by the United States reclamation service or the Carey Act projects, and not to the privately constructed projects. I want to remark parenthetically, at this point also, that if the business interests, generally, would concern themselves as much in helping the struggling farmer during his first few years on the homestead as they concern themselves in having the projects constructed, there would not be much of a problem in this line to solve.

The mudsill on which this problem rests is constructed of two elements. One is the misconception of the person who

becomes the farmer on the project and the other is the over-coloured literature advertising the chances the irrigated homestead offers. As a result of the second we get the first. The literature creates the misconception. Misguided as to the real situation and most frequently inexperienced in farming of any sort, the one who is to take the claim reaches the irrigation project without means, having been possessed at the start, with only of the needed car fare to the land. Arriving there he is up against it—hard against it too. The conditions he had pictured so advantageously become stern realities shorn of all their gaudiness, and, almost before he has learned the directions, he is but a step from want and not a cent of credit at the banks. He has not a thing to gain credit. He didn't realize that to start on the irrigated farm he needed the money required for his house, for his barn, for the purchase of cows and chickens and pigs, and shelter for all of them, and then enough money extra to get through the first year—for he won't market much the first year. It is from the men who lacked all these things of which I have spoken that most of the complaints and criticism against irrigation come. It is towards them that I want to direct my remarks and to offer the Great Falls method as a sane, sure and reasonably easy remedy.

There is a burden resting on the business community adjacent to every irrigation project which cannot be too forcibly emphasized. That burden is co-operation with the farmer on the project, a co-operation not alone to benefit, and help the farmer, but also to result in the upbuilding of the community in general. The business man owes it to himself. Whatever helps the farmer in his community is merely the case of the old proverb of casting bread on the waters, for it surely will return.

Firmly convinced of the doctrine I have enunciated, I concluded to enlist my fellow business men at Great Falls in the work of helping the farmers on the Fort Shaw unit of the Sun river project, confining our efforts to a definite territory until we had tested the plan. It was especially pleasant to have the hearty and general response to the plan, and from it grew the method of which I shall tell you—the raising of the \$10,000 fund for use in buying dairy stock for the project farmers. It was agreed that the aid should be given only to the farmers whose moral character and integrity were well vouched for by their neighbours and whose industry, also, was beyond question. To such we stood ready to lend aid in building up the dairy industry and thus giving to Great Falls something that was needed in the way of a known article in the dairy products, and also in keeping our money for that line of goods at home. This is why we have felt warranted in calling it the Great Falls plan.

Twenty of our leading business men signed an agreement, prepared on lines that left no doubt about its legality, binding themselves to the extent \$500. each to create the Ten Thousand Dollar Dairy Fund. Secured by this, one of our leading banking institutions agreed to finance the bringing of dairy stock to the project. It fell to my lot to be chosen the trustee of the fund, my associates insisting that because I had been active in initiating the plan that I ought to serve in that capacity, and for the reason that I had always been and am still enthusiastically interested in doing whatever is possible to help to develop the Sun river project and for the welfare of its people.

Agricultural authorities are agreed and experience has proved it to the laity, that diversified farming is the best and surest method of successful operation on small acreage, and dairy stock is particularly essential on the small farm. No farmer is better able to handle dairy stock than the one who is in a position to grow alfalfa on his land, because of the dependable supply of water, made certain by the irrigation method. I have taken some pains in looking into the dairy industry, and it has been my observation that without exception, where we find dairy interests, there also we find a prosperous community. And for this reason, we chose the plan of helping to build up the dairy business in the Sun River valley as our method of helping our farmers on the irrigated land. I need not stop here to relate how Montana has been for years spending millions of dollars annually for much she ought to be growing at home, and one of the big elements has been the supply of butter and cheese our people use. It must suffice here to say that while we gave the farmer something to help him to add to his wealth, we also opened to ourselves a small portion of home made dairy goods which our city needed.

The steps of procedure in our work are simple and easy to take. First the settler who is interested in the opportunity makes application for aid to buy cows. Five head is the limit set on the aid given to any one farmer. After the application is in, the second step is the enquiry into the worthiness of the case. If the report is favourable, the farmer is notified that the funds will be furnished him. Just here we give the farmer to understand that he is his own business agent; that we are not selling cows, for we thus clear our organization of any suspicion of gain or profit in the role of a middleman between the buyer and the seller. We tell him to find his stock, that all we do is to furnish the money. If he knows of no stock, we possibly advise him where we know of good stock for sale, but that is as far as we go in that direction. The negotiations are between buyer and seller, the only thing that we insist upon being, to know that the deal is a bona fide one.

Before we pay for the stock, the farmer signs a contract note, the contract being that he will provide shelter, feed and properly care for the animal or animals purchased, milk them, and pay half the proceeds of the sale of the cream, on his note to the underwriting company. He pays eight per cent interest, provides an insurance policy of \$50. on the cow, which is a protection to himself, as well as to the financing company. These loans are made usually—I think in our case without exception—to men who had no credit at the bank without such a plan. That is the class we wanted to reach, men either who had not yet built up a credit at the banks or for some reason had exhausted their credit.

What has been the result? It has caused the building of a cheese factory, started by the co-operated efforts of the farmers of the project, which gives a market for the milk, and from it already there has been manufactured about 100,000 pounds of as good cheese as can be had in America of its grade. This cheese takes the place of goods heretofore gotten in the East, for which our own money was shipped out. Some of the farmers, living too far from the cheese factory to patronize it, have sent their milk to a creamery. Our case is typical. The same conditions existed there that exist wherever a new project is constructed. There is no reason why millions of dollars worth of dairy products now shipped to our western points from the eastern country should not be produced at home by our own people, and given to our consumers fresher and cheaper than after the long haul and the excessive freight charges. Co-operation between the business men and the farmers on the irrigated project will help to bring this about. It will come when the business man sees the light which ought to guide him, and realizes that the opportunity in the big West lies in the path marked "Co-operation" with the farmer on the other end of the deal.

Discouragements will be met in working out the plan we have now put into excellent service at Great Falls. We had trying experiences. The farmers, as a class, are inclined to be suspicious of the city folk who talk about "aiding" them. They are sceptical of any philanthropy, and so knock that out of them to start with by telling them that it is nothing but a cold business deal, and unless he wants to pay the interest there will be nothing doing. When I first started this work I laboured under the impression that when I had made it clear to the farmer there was money available for them to buy stock they would scramble over each other to get a chance. But there were no applications at first. I had to go to the project time and time again and talk with them, visit them at their ranches, talk with their wives and their children and encourage them by various ways to look into the matter. Finally the ice was broken, and now, since those who led the

way have become active and aggressive missionaries—since their neighbours see the results in the new calves and the prosperity that comes in the monthly check that the man who bought the cows can afford—there has come a large demand for money, and our first \$10,000 is exhausted. We will have opportunity this season to loan on the same plan more than three times the fund, if we can raise it, and after the business men have seen the advantage which has come from the first effort, I contemplate no difficulty in underwriting a loan for \$25,000, \$30,000 or even \$50,000, if the matter is undertaken, and it surely will be.

When I was made trustee of the fund, it was my original intention to utilize the opportunity offered by our state agricultural college, by having one of the experts from the department of animal industry go to one of the dairy centres and ship to us three or four carloads of good cows. But the settlers seemed afraid to commit themselves on such an undertaking, being timid about allowing anyone but themselves to make a choice of the cows. So we were fortunate to have in our state a well known capitalist who met the situation by going east and buying 240 head of good dairy cows and bringing them to take a chance of selling them in our particular territory. Happily, he met with great success, and he secured a second shipment of 120 head. A local bank shipped in three carloads, and so we thus were able to find plenty of animals for the needs this season, and especially all that we could buy with the \$10,000 fund.

In short, my experience and my observation both support the statement that it is absolutely necessary for the cities and towns located near irrigation projects to realize their opportunity existing in the project, and to make the most of the opportunity by a greater interest and a closer co-operation with the settler on the farm. The farmer needs the help, and the city and the town needs the result of the developed farm. The man who works at the desk in the city, and the man who works behind the counter, just as surely as the farmer who walks in the furrow, has a work to do in the upbuilding of the farming community. It can be done best by co-operation, and therein lies the opportunity for the city man to extend the hand of aid to his brother on the farm. And after all gentlemen, is not the greatest fact in humanity the fact that we are brothers? (Applause).

Mr. E. M. CHANDLER, of Washington: I would like to ask Mr. Newman to explain, if he can off-hand, the financial outcome of the cheese factory and some of the details of its working and financing.

MR. NEWMAN: The operation of the cheese factory has been very successful. The factory was started on the

co-operative plan, stock being distributed amongst the farmers on that unit. It was started about six months ago, and about thirty days ago the plant was paying a little better than expenses and the receipts of milk were increasing daily. The factory was not run at its full capacity, because the supply of milk was not quite sufficient, but on the other hand the cheese factory being so centrally located gives the farmers a ready market close at hand. As I have stated, a month ago, the last time I visited the factory, it was better than paying expenses, and I expect it will show a small dividend on the investment at the present time, and when the factory is running at full capacity I am confident it will show a very fair interest on the investment.

MR. CHANDLER: About what was the first cost of the cheese factory and about what was the capacity?

MR. NEWMAN: The first cost, as I remember it, was about \$2,000. Now the output was...I do not want to make any rash statements, because I am not quite sure of that. I do not want to make any statements that I do not feel confident are absolutely correct.... I can state with positive knowledge and assurance, though, that the statement I have made is correct in so far as the factory having paid better than expenses, and that it is showing a small interest on the investment itself. (Applause)

MR. W. R. AUSTIN of British Columbia: What is done with the by-product of the cheese factory and also at the creamery which was a little distance off?

MR. NEWMAN: The by-products which accumulate are given back to the farmers for feed purposes for their hogs and so on. That is given back without any cost. As to the creamery I could not say.

MR. E. C. BURLINGAME, of Washington: What was the capacity of your cheese factory? How many cows have you working?

MR. NEWMAN: About 400 was the capacity.

MR. BURLINGAME: In your selection, as between a creamery and a cheese factory, did you find that it was more profitable to make cheese than butter?

MR. NEWMAN: Yes, the experience of our farmers there has been that they get a better return on their milk out of the cheese factory than they do shipping their cream to a creamery.

MR. G. R. MARNOCH, of Alberta: I would like to add an expression about what Mr. Newman has told us about this Great Falls scheme. Down at Lethbridge we have laid

out a scheme almost on these identical lines. I am almost certain that, if Mr. Newman had not happened in that night, the forwarding of our scheme would not have reached the success that it has attained now, but when Mr. Newman was able to tell our members that he actually had such a scheme in actual working order, it carried right away and we had no difficulty in getting sixty or more of the business men in Lethbridge to sign an individual guarantee of \$150.00 each providing us with \$9,300.00 to start operations. As Mr. Newman told us, he said we would have a little difficulty in getting the farmers to come forward and take advantage of it. That was our exact experience. We had the thing before them for quite a couple of months before we got any applications at all and then they began to come in fast.

Up to the present we have actually dealt with two men, and we have indicated to four or five others that we will supply them. We took Mr. Newman's plan and we made the farmer himself his own agent and his own purchaser. He can see what cow he can get and what he can sell. One neighbour had a number of calves which he was going to sell for veal. Another man bought them for \$25 each, and he got the pick of the calves and was able to get all the heifers. Our scheme at Lethbridge takes very much the line of Mr. Newman's and it has proved to be an incentive for any other cities who are thinking of doing anything of this kind on the same excellent plan.

We have had this little difficulty which we foresaw and that is, that in an extreme case a man might get a big loss. All the cows might die and the farmer might die at the same time. Now what was to be done in a case like that? Mr. Newman's plan provided for that by allowing \$50.00 per cow insurance. I have the impression in my mind that this insurance was very expensive, and our plan for getting over that was, that we had the farmers make their purchases at the lowest possible cash price, and we added five per cent. to that, which we kept as a reserve fund to provide for any such losses. On the one hand there is the fact that they could not possibly buy at cash prices if they wanted to sign a note, and at present they would have difficulty in buying at all. As we explained to them also, this is a mutual arrangement between the farmers and the business men, and if we did kick up against a bad loss it would not put the kibosh on the whole thing. The farmers see that, and take to it very well. I would like to ask Mr. Newman what arrangements he has made about insurance.

MR. NEWMAN: In the beginning I want to thank Mr. Marnoch, President of the Board of Trade, of Lethbridge, for the handsome compliment he has paid me in connection

with the plan at Lethbridge, but for which I do not think I am entitled to such an extent as Mr. Marnoch extends to me.

In reply to Mr. Marnoch's question, there is an old saying of where there is a credit there is bound to be some loss. I presume there are very few exceptions to this case, and I presume that when we are called upon to settle up with the bank, which is furnishing the money, I presume there will be a small loss which the business men I referred to will be called upon to pay. We are, however, protected, first by the form of a contract note which provides that the stock really belongs to our organization till the stock is entirely paid for. If any care or any judgment is exercised in the farmers to whom credit is extended I think that the chances of loss ought to be very slight.

Now one of the advantages of the plan which I have outlined here is that the business men who have signed this paper are simply to extend their credit for the benefit of the farmers, the bank itself furnishing the money. I presume when it comes to settling up with the bank there may be a small loss. It is possible that an earthquake, or something of that kind may occur, or a great flood—you cannot tell; but I believe that our plan is as safe as a plan of that kind can be mapped out. With the insurance on the cows, and the title being in our name until the stock is paid for, I think chances for loss are very slight, and if there is a small loss, why I do not think that the business of Great Falls will hesitate at all to pay it, and pay it gladly, because of the benefit that the city itself has received from the general plan.

MR. MARNOCH: I think Mr. Newman does not get the exact point which I wish to make. Do I understand that there is an insurance of \$50.00 on each cow?

MR. NEWMAN: Yes.

MR. MARNOCH: What does that cost?

MR. NEWMAN: \$3.50 for each \$50.00 insurance per year.

MR. MARNOCH: In the Lethbridge case it is 7% but we have provided our own insurance for 5%.

PRESIDENT YOUNG: I hate to close this discussion, which is particularly important, and which would probably occupy the time of the Convention until noon hour, but there are others on the programme and I will now call on Mr. Finkle of California to discuss "Silt Problems of the Colorado River." (Applause.)

Address by

F. C. Finkle

Consulting Engineer

SILT PROBLEMS OF THE COLORADO RIVER

Mr. Chairman, Fellow Delegates, Ladies and Gentlemen;

Before reading my paper, as coming from the extreme southwestern part of the United States, southern California, I desire to compliment the city of Calgary, the province of Alberta and the Dominion of Canada upon this very successful and entertaining Congress. I think I have the right to speak well of this Congress, as I have been rather a constant attendant at the meetings of this Congress in previous years, in fact at the very first Congress held in Salt Lake City, the home of our esteemed friend and President, Major Young, it was my good fortune to be there also, and I want to say that successful as was that meeting this meeting compares with it very favourably. Now that Congress was held the 15th, 16th, and 17th, of September, 1891, twenty-three years ago some twenty days at this time, and during all of these years the annual sessions have occurred, except on three occasions, in 1892, in 1901 and in 1913, which were missed. The international character of the Congress is certainly a very important thing, and I believe that the movement of bringing it to Canada has been one of the greatest things in the history of this Irrigation Congress movement, and I hope that hereafter it will be held not only in the United States again, but in other parts of the world, and in other countries, because the question of irrigation is one of national importance.

Before reading my paper I want to say this, that, in our section of the country—and this thought is inspired by listening to the difficulties of obtaining settlers on the land—in our section we have no such difficulties. The only difficulty we have is obtaining capital for development. There has never been any trouble in obtaining settlers, because of our environment, and on account of the very mild climatic conditions. The enterprises in Southern California have all been executed by private capital up to the present time, and they have all been successful, and while you will observe that the large enterprise which I will discuss is in the hands of a receiver, that is not due to the fact that settlers were not obtained on the land, but is wholly due to the fact that the Colorado river broke out of its course and caused the flooding of some of the territory and in order to escape the consequences of heavy damages and things of that kind, that enterprise was placed in the hands of a receiver.

I might say at this time that with the European war in progress, and with the financial conditions as bad as they are, none of our enterprises have gone into the hands of a receiver or are in trouble at this time. There are several of them which are fully settled, that Nyland and several others like the Fontana project, 17,000 acres, and Ukipa project, they have all been able to settle their lands as soon as they were placed under irrigation. Now when it was proposed that I should read this paper on this subject there were some misgivings that it might not interest the people of Canada, because silt problems are not problems of your rivers, but it was thought that as the Congress is of an international character and deals with problems all over the world, it might be well to deal with this problem, which is met with in so many places in the United States and elsewhere in the world. I might say here that our distinguished guest, Mr. Von Weymarn of Russia, informs me that in his country this is a very important problem in many parts.

With your indulgence I will read this paper.

The Colorado river is by far the most important stream in the western part of the United States. Without making comparison in detail with any of the other large rivers in the West, suffice it to say, that everything considered, including climate and soil conditions of the area, which may be irrigated from this river, its value is very much greater than that of any other western stream.

The Colorado river has a drainage area above Yuma of approximately 225,000 square miles, which lie in seven different states of the Union. Its principal tributaries are the Green, Grand and Gila rivers.

The amount of water supplied by the Colorado river has been gauged at Yuma, Arizona, since the year 1894, and in round numbers the mean annual discharge at this point is equal to about 10,000,000 acre feet, sufficient water to cover 10,000,000 acres to a depth of one foot.

It is only within the last twenty years that the real value of the Colorado river has become known to the world. Previously, irrigation was practised to a greater or less extent from its tributaries in Colorado, Utah and other states, drained by the upper tributaries of the river. At that time the value of the stream compared with many other rivers from the Rocky Mountain region, from which the water is devoted to irrigation in the mountain valleys and on the plateaus of the interior.

It is only since the discovery was made that the great Imperial Valley in California could be irrigated by the waters of the Colorado river, that its real value has become apparent. Investigations looking to possibilities of irrigating Imperial Valley were commenced as early as the year 1891, the same

year, when the first International Irrigation Congress was held in Salt Lake City, Utah.

The speaker, who was also present at the first Irrigation Congress, was at that time conducting an investigation of the lower Colorado river, which had even then assumed sufficient importance to warrant public discussion. Surveys to determine the feasibility of diverting the Colorado river were made, and reports were prepared, giving an approximate idea of what might be accomplished.

It was not until the year 1899 that sufficient financial aid was secured to begin actual work on the undertaking. It has, however, been done by entirely new people, the first promoters having been discouraged during the world-wide financial panic of 1893.

In order to understand the situation on the lower Colorado, it is necessary to draw a word picture of the Imperial Valley and its relation to the river. The greater part of the Imperial Valley is situated at a considerable elevation below sea level. The lowest point is in the Selton Sink, now known as Lake Imperial, which is 287 feet below sea level. The greater part of the Valley in the United States varies from sea level down to the elevation of Lake Imperial. In Mexico it rises to twenty-four feet above sea level at Volcano lake. There are other tracts of desert land out side of Imperial Valley proper, lying in the United States, and situated at elevations, ranging from sea level to 100 feet above, or slightly more.

The present intake of the main canal leading to Imperial Valley is a little over 100 feet above sea level, but the topography is such that diversions from it within the United States are not practicable, until a point near sea level is reached.

It is interesting to consider historically the formation of the present topography in the Imperial Valley and along the through lower Colorado river.

Where the river at present enters Volcano lake through the channel of Bee river, the elevation is thirty to thirty-five feet above sea level. The regular channel of the stream, which has not been occupied by water below the inlet to Bee river since the year 1911, passes over a delta entering the upper end of the Gulf of Lower California. At the present time the flow passes through Bee river, into Volcano lake, and thence Hardy's Colorado into the Gulf of California.

Before the existence of the Imperial Valley, the Colorado river entered the Gulf of Lower California at a point several hundred miles south from its upper end, near the vicinity of Hanlon's Landing, where the intake of the present irrigation system is located. The silt carried by the water of the stream formed a delta encroaching laterally, and further and further into the gulf, until it finally formed a dam entirely across the gulf, along that portion of it lying immediately

south of the international boundary line between the United States and Mexico.

After the delta or dam had separated the gulf into two parts, one an inland sea lying in that portion of the United States now Imperial Valley, there is no doubt that the stream continued to shift alternately into the ocean and alternately into this inland sea. During this period of time the silt deposits made the fertile soil, which now comprises the Imperial Valley.

It is probable, that shortly before the dawn of civilization in the West, the Colorado river assumed its present channel leading to the Gulf of Lower California. There was then considerable elevated land lying between Imperial Valley and the Gulf and extending in the direction of Volcano lake. Evidences are conclusive to show that the stream has maintained this course with but slight interruptions during the last 100 years. During this time there have been some diversions of the river into the inland sea, but these were not sufficient to maintain it. The inland sea disappeared through evaporation, except a small part fed by some of the channels of the Alamo river, Bee river, etc., leading in that direction.

The water cut off from the gulf having evaporated has left the large areas, known as Imperial Valley, forming a basin below sea level, with only a small lake in the deepest depression. When first viewed by the people of California and Mexico it was so found, and this is the condition in which it was over twenty years ago when the first plans for its reclamation were given consideration.

It is therefore safe to state that the creation of the Valley is due to the silt carried by the water of the river, and we shall further see that this silt has played, and still continues to play, an important part in the irrigation projects of the Valley. It will also become apparent during the course of these remarks that the importance of the silt problem has never been fully understood, and, with all the progress made during the last fifteen years in dealing with the subject, its importance is nevertheless under-estimated.

The first diversion was made into a channel of the Alamo river, which terminated in Imperial Valley, and thus afforded an easy method for conveying the water to a point where it is diverted out of the Alamo at Sharp's Heading for distribution in the Imperial Valley.

In the earlier plan for the utilization of the Colorado in Imperial Valley the speaker suggested its diversion into Bee river and Volcano lake, and thence to be distributed by canals over the Imperial Valley. This plan had the disadvantage of locating the intake, as well as the entire main canal system, in Mexico. But it possessed the advantage of having a settling basin in Volcano lake, where the troublesome part of the

silt could be eliminated from the water, before turning it into the distributing canals.

The Alamo river which was finally utilized as a main canal by the promoters of the irrigation system, who were not at that time informed as to the other plan, has its intake in the United States, close to the international boundary line, and passes entirely through Mexican territory on its way to Imperial Valley.

The diversion of the Colorado into the Alamo, which since then has become the main irrigation canal, soon began to develop difficulties on account of the presence of silt. Before proceeding with the discussion of these difficulties, and the manner in which they were overcome, a brief statement as to the condition of the Colorado river water with reference to silt will not be out of place.

The appearance of the water is a dark red to brown, due to the character of the silt. From this it has taken its name, the Spanish word Colorado meaning red. The Arizona experiment station on the Lower Colorado has investigated the amount of silt carried by the stream and in this way as determined that it delivers on the average from 35,000 to 40,000 acre feet of silt per annum.

The amount of silt carried varies greatly at different times, being highest when the river is in flood, and may be roughly stated to range between 80 to 3,500 parts per 100,000 parts of water by weight, or from the one-thirtieth to the twelve-hundredth part of volume of water by weight. On an average it is fair to say that the Colorado river carries from nine to ten tons of silt in each acre foot of water.

In accordance with the well known law governing the transporting power of water, the volume of silt carried depends on the velocity of the stream. Under the variable conditions as to the velocity it soon became apparent that irrigating canals would at times accumulate silt, as it is impossible to construct them on a sufficiently steep grade, with safety to the banks, to ensure the carrying of all of the silt delivered, when the Colorado river is at its flood stage.

Whenever the water assumes a velocity in the canals less than in the river, the lessening of the transporting power induces the disposition of silt. These difficulties soon became apparent in the Alamo river, used as the main canal. The deposits first occurred in the upper reaches of the main canal, until the level was raised to such an extent that diversions into it from the stream were no longer possible.

It must here be remembered that the Colorado is a navigable stream as far as Potholes above Yuma, and that no dam, for diverting its water at the head of the Imperial canal, is permitted by the War Department of the United States, which has charge of the navigable rivers. Without such a dam the

silt in the canal soon made it impossible to divert water, except during high stages of the river.

The first canal intake had to be abandoned, and a new cut leading into the Alamo below the point where the deposit of silt was deep had to be made. But the second intake soon shared the fate of the first, and had to be abandoned for a third one. This third intake was constructed without any safe headgate to regulate the water and in 1905 it washed out, until the whole Colorado river passed through it into the main canal, finding its way into Lake Imperial through the Alamo river and New river. This disastrous overflow of the valley required two years to curb at a cost of many millions of dollars, with large incidental losses which facts have been inadequately described in the engineering publications, and about which all engineers have read more or less.

After the break was closed, a concrete headgate was constructed at the present site of the intake, and with certain changes this improvement has continued in use up to the present time. However, the silt difficulty was not remedied by the present concrete headgate, as this only served to give better control of the amount of water diverted when the Colorado river was high. The silt still continued to settle in the intake and in the canals. The Imperial Valley experienced a water shortage, due to the fact that, as soon as the Colorado reached a certain level, sufficient water would no longer flow into the intake of the canal.

Losses in crops amounting to hundreds of thousands of dollars resulted in the years 1908, 1909 and 1910, during which time the level of the main canal was gradually rising, on account of the silt deposited. The canal was so wide that it could not be cleaned out by means of ordinary appliances, as in the case of small irrigation canals and ditches. Those in charge were unable to devise any method by which to remove the silt, and on account of this and other difficulties, the company became bankrupt, and was placed in the hands of a court receiver.

The culmination came in 1910, when less than one-fourth of the needed amount of water could be diverted during the month of July. The receiver of the company secured permission from the War Department to construct a pile trestle in the Colorado above the intake, for the purpose of forcing water into and through the canal.

This was done at heavy cost, by driving piles and dumping large rocks into the bottom of the river above the trestle. Thus temporary relief was obtained during the latter part of 1910. The receiver of the company then assumed that it would be necessary to repeat this operation each year, which would incur an expense far beyond the receipts obtained from the sale of water at fifty cents per acre foot delivered.

Thereupon an order from the court to increase the rate 60 % was sought by the receiver. This was contested by the consumers under the water system in a court action, on the ground that this method of operating would not be successful, as the deposits of silt would still continue to increase, until the channel and intake would be completely filled.

During the trial of the case this was demonstrated to the court, and another method for ridding the intake and canal of silt was submitted for the consideration of the court by the representatives of the water consumers. Before the conclusion of the trial, however, the receiver of the company became convinced that this method should be tried, and a compromise resulted, which permitted the water rate to remain at the old rate of fifty cents per acre foot, while the new method was being tried.

The speaker represented the water consumers as expert in these proceedings and discussions, and was selected to design the equipment planned for the purpose of handling the silt. This plan was merely the operation of suction dredges in the canal, whenever necessary to pump the silt out, to maintain the proper level of the main canal. The case was compromised and the suction dredge Imperial was constructed and placed in operation in the spring of 1911.

The result was to quickly eliminate the silt which had accumulated in the canal, and an abundant supply of water was delivered during the entire year of 1911. The dredge Imperial, after being constructed for the water consumers, was first turned over to the receiver and placed in operation on April 23rd, 1911, and from that time to June 1911, it pumped out a total of 122,105 cubic yards of solid material from the canal, lifting it to a height of thirty-five feet at a cost of 4.8 cents per cubic yard.

By this time the water in the river had receded, but the silt had been removed sufficiently to assure all the water needed, and after the removal of over 500,000 cubic yards during the summer of 1911, the intake and canal had been restored to their proper width and original level and grade.

Subsequently another small dredge was constructed by the receiver, known as the Dredge El Centro. This was placed between the concrete gate and the river to remove deposits and bars forming above the headgates. Ever since 1910 these two dredges have been operated in the main canal, and records show that, during the year 1913, 903,000 cubic yards of silt were pumped from the main canal by means of these two dredges.

This solved the silt question as far as the main canal and intake were concerned, but trouble was experienced in the smaller lateral canals, which had to be kept open at great expense. The solution of this was finally worked out by the

use of small dredges operated from the bank to clean these smaller canals.

The smaller dredges are of two kinds, known as the Stockton and Austin dredges. They are run on planks laid along the banks of the canals, and move forward as the dredges work down stream. They deposit the material excavated on the opposite bank by means of dipper excavators or endless elevators. Both types of dredges have done the work successfully, but at a slightly different cost.

In this connection the report of Mr. Ray S. Carberry, Superintendent of Imperial Water Co. No. 1, which irrigated over 100,000 acres of land for the year 1913, is interesting. It shows that 37.3 miles of canals were cleaned by means of the Stockton dredge, which excavated 188,708 cubic yards of material at a cost of 10.7 cents per cubic yard. During the same year the Austin Dredge worked on 33½ miles of canal and removed 96,712 cubic yards at 16.8 cents per cubic yard. In 1913 another dredge known as the Schlatter dredge, worked on four miles of canal, where 3,862 cubic yards were handled at 15 cents per cubic yard.

In this connection it is interesting to note that Imperial Water Company No. 1 is the largest sub-company, which takes water from the main canal in the capacity of consumer, but there are also many smaller companies taking water in the same manner for an area aggregating approximately two and one-half times as much as the territory irrigated by Imperial Water Co. No. 1. Even with this, not much more than one-half of the irrigable area in Imperial Valley is at acres present under cultivation, as there are approximately 500,000 in the United States, which will ultimately be irrigated from the Colorado river in Imperial Valley.

So far as the silt question in the main and lateral canals of the Imperial Valley are concerned, it may be stated, that these methods have satisfactorily solved it, and it is now possible to operate the system economically and without interruptions in service. Since all the dredges work while the water is flowing through the conduits, the serving of water continues, while the canals are cleaned, and the remaining portion of the silt carried by the water is deposited on the land. This amount is variable, depending upon the extent to which the velocity in the canal is decreased before the water is delivered to the land.

Ordinarily it may be said that, if the mean velocity of the water flowing in the canals is three feet per second, or more, no appreciable amount of silt is deposited. But it is impossible to maintain this velocity, owing to the varying demands for water, and the necessity for checking the flow in order to make deliveries. This is given as a good average, but the growing and irrigation season in Imperial Valley continues

throughout the whole year, which makes a great deal of difference because the silt content of the Colorado river varies in different months.

The injury from silt in the irrigation system has been neutralized by dredging, which has been carried on at a much lower cost than was originally expected. Now remains the problem of overcoming the deposits of silt in the river channel itself, which are likely to occur to such an extent that it will again overflow into Lake Imperial.

The bed of the river below Hanlon's Heading, where the water is diverted for Imperial Valley, varies greatly in width and the velocity at various points shows wide fluctuations. Under these conditions silt is continuously deposited, and the tendency of the flow is to shift away from points in the channel which have thus been raised by silting.

The Reclamation Service in recent years has done much to maintain the channel as uniform as possible, but being interested in the Arizonan side, on which the Yuma project is located, this made it natural for them to do more for the purpose of preventing the river from making incursions into Arizona than into California. However the work of the Reclamation Service on the Arizona side has been of a very beneficial character.

The receiver of the California Development Company, bankrupt owner of the Imperial Valley water system, has devoted much of his energy and resources to protecting Imperial Valley since the closing of the break in 1907. The resources and facilities however, have been insufficient to properly handle the situation, and in 1910 the Colorado river left its channel going into Bee river, and has since flowed continuously into Volcano lake.

After filling Volcano lake to the level of the outlet into Hardy's Colorado, the water flowed through this ancient channel into the Gulf of Lower California.

Volcano lake is situated at the terminus of the Bee river, one of the former channels of the Colorado. It is a large extent of flat country made by deposits of silt in a portion of the former gulf to its present level of approximately twenty-five feet above sea level. This lake has two outlets, one being New river, flowing into Imperial Valley and terminating in Lake Imperial, and the other being Hardy's Colorado, flowing in an opposite direction into the Gulf of Lower California. The occupants of the Imperial Valley now interested in irrigation, have erected a levee along the north line of Volcano lake to prevent its water from entering the Imperial basin through New river.

It is evident, that as soon as the Colorado began to flow into Volcano lake, the decrease of velocity in the lake caused silt to settle rapidly, and this has continued from 1910

to the present time. This process, if not interfered with, will eventually raise the level of Volcano lake so that water cannot be confined in it by means of levees.

After this has occurred, the question as to where the water will break out is one on which opinions may differ, but it may be conservatively stated that it is just as likely to break over into Imperial Valley as in any other direction.

When the Colorado began to flow through Bee river in 1910, apprehension was justly felt by settlers in Imperial Valley. The cause of this change of channel was the raising of the Colorado river bed, below Bee river, through deposits of silt. This situation was deemed very serious and too complex for the interests of Imperial Valley to handle alone, and the government of the United States interested itself to the extent of approximately \$1,000,000 appropriated for turning the Colorado back into its own channel, by closing the inlet of Bee river. This work was begun in the early part of 1911, and continued throughout the greater part of the year without success.

Much controversy has existed as to why the government and its engineers failed to successfully re-divert the Colorado from Bee river into its own channel. The various discussions of this have heretofore ignored the main points involved. The attempt was made to turn the water back by means of levees, and this method was not open to criticism, but there are two elements which have been overlooked.

The first one of these was the fact that the channel of the river below the break was heavily silted. The speaker, who was at that time consulting engineer for the Mutual Water companies in Imperial Valley, controlled by the consumers of water, and not by the receiver of the California Development Co., gave careful consideration to and examined the channel after that attempt to close the break had failed.

Observations showed, that the bed of the Colorado river had been raised by silt, partly produced before the break, by reason of the wide stream below that point, partly during the period of changing into Bee river, on account of the diminishing flow causing a lower velocity in that part of the Colorado, and partly after the bed had become dry, causing vegetation to spring up and the wind to carry sand and dust, which lodged against this growth of vegetation.

No measurements were taken to determine how much to lower the Colorado river channel at this point, before the levee across the upper end of the Bee river was begun. Neither was the levee located as close to the inlet of the Bee river as would have been possible, but it was placed a considerable distance down stream, which made it necessary to built higher than if it had been placed at the very outlet of the Colorado into Bee river.

The failure to close the break does not demonstrate that the attempt would not have been successful had the matters referred to been investigated, and the work ordered accordingly. There is no doubt that the failure to close the break was due to the excessive pressure, on account of the high level to which the water had to be raised against the trestle and rock dam across Bee river. Had the required height been only a few feet less there is no doubt that the attempt would have been a complete success. But there is a limit to the pressure which a pile trestle and rock dam on Colorado river silt will stand, and the limit was but slightly increased.

If a large dredge had been operated in the main channel of the Colorado river below the break, both before and during the installation of the pile and rock dam in Bee river, the height to which the water must be raised would have been diminished and the closure would have been effected.

Careful computations show that locating the dam higher up Bee river, and doing the necessary dredging at that time, would have decreased the height to which the water would have to be raised, where the pile trestle and rock fill dam was placed by not less than four feet, and possibly as much as five feet. There is no doubt that the difference would have been sufficient to keep the pressure on the rock fill within safe limits, so that it would have been successful and permanent.

Since 1911 no further attempt has been made to restore the Colorado to its own channel, and the whole stream has ever since been flowing through the river into Volcano lake. The increase of elevation in Volcano lake, from the silt settling within it, has already caused trouble, and in the spring of the present year (1914) the Volcano lake levee broke, sending a large volume of water into Imperial Valley. This overflow only affected a section of country in Mexico, as it entered the channel of New river before reaching the United States.

Nevertheless, it caused considerable apprehension on account of the volume of water in New river, which threatened to undermine the irrigation flumes and bridges across that stream. Immediate alarm was caused by this break, and all interested began to assist in the repair of the Volcano Lake levee to prevent the water from flowing north into Imperial Valley. This work was successfully done, and the river is at present kept under control in Volcano lake, and flows through Hardy's Colorado into the Gulf of Lower California.

The real problem being confronted, however, is to give recognition to the fact, that unless something of a permanent nature is undertaken, the area covered by Volcano lake will soon be raised so high that no levee will confine the water along the north and keep it from entering Imperial Valley.

While there is no cause for immediate alarm, as it is still possible to raise the levees higher by properly extending them, yet it is better to take the matter up and provide a plan to avoid any future catastrophe, than to wait until something occurs to equal the overflow, which occurred from 1905 to 1907.

Just what the details of such plans are to be, it is impossible to announce without a further study of the situation, but enough is known to assert that it will have to be both dredging and building of dykes.

It is not even certain, that at this time it will be best to have the river returned to its original channel below the inlet of Bee river. It has flowed for nearly five years through Bee river into Volcano lake, during which time much silt has been deposited in various places, and the conditions have been changed to such an extent that the plan, which was feasible in 1911, may be well-nigh impossible at this time. As to this, an opinion cannot be expressed without careful consideration of the whole situation. As such a study will require considerable field work and time it should be undertaken speedily to avoid the dangers of delay.

The speaker has had sufficient experience with the Colorado river, and the problems resulting from it, to feel certain that the question can be solved so as to render the Imperial Valley permanently safe against future overflow. Further, it is certain that the cost will not be unreasonable, much less prohibitive, if the work be properly planned and carried out under competent advice and supervision.

In view of this knowledge of the situation, it can be asserted that the Colorado river silt will eventually become a blessing, instead of a menace to the Imperial Valley. It is a blessing, because annual fertilization of the land, irrigated by water from the Colorado river, will always preserve its fertility, in fact, make it perpetually as good as virgin soil.

No plan of dredging to handle the silt will ever remove as much of it from the water, that it will be insufficient to reach the land for enriching the soil. Thus Imperial Valley may be likened to the Valley of the Nile, whose overflows annually restore the land, and for which reason it may be so extensively cultivated.

Some idea of what the Imperial Valley may eventually become can be obtained by comparing it with the Valley of the Nile in Egypt, for, if anything, Imperial Valley has the advantage and will be able to produce more and support a larger population in proportion to area, than the Valley of the Nile.

Before this becomes a reality, however, the silt troubles of the Colorado must be understood and corrected, so that silt will no longer settle and be able to remain in places, tending

to deflect the stream into Imperial Valley, which, as we have already seen, lies below sea level.

The problem is a large one, and must be met with complete co-operation on the part of all concerned, including those interested in and residing in the Imperial Valley, by the state of California and by the United States. (Applause).

MR. SORENSEN: Mr. Chairman. Might I be allowed to ask a few questions? I understand that silting has been going on on the Colorado river. Now has the Colorado been doing this for years of itself, or has this occurred since it has been diverted?

MR. FINKLE: The Colorado river carries this silt. It comes from areas in the southern part of Colorado and Utah and Arizona. It is this very silt which has caused the valley, by forming a dam and cutting off six or seven thousand acres, from which the water evaporated, leaving that valley lying below sea level. The proposition is now to fill up the channel so that the water will not return and inundate that district. This silt fills the bed of the river at all points where it is wide and shallow. It continually deposits there and gains from year to year.

MR. SORENSEN: Does that silt act as a fertilizer?

MR. FINKLE: Yes, it is considered a very valuable fertilizer. It contains some humus and is considered valuable.

MR. E. C. BURLINGAME, of Washington: I would like to ask the gentleman, how many years do you have to place the surplus which you dredge from your main canal?

MR. FINKLE: That can be run by a flume back into your main canal. That has not yet been done because there was a section of country about fourteen feet lower than the canal and the silt has been deposited to fill up that section, but when that is filled up there will be a rapid fall back to the Colorado river and one channel will carry that back into the Gulf of Lower California.

MR. BURLINGAME: Is not the final result of this proposition, the raising of the land surrounding that canal?

MR. FINKLE: The observation has shown that the land is being raised from one-eighth to one-quarter of an inch per annum at the present time, and of course the canals will have to be raised along with that. I am not able to state the exact amount, but it is so slight that we hardly observe it from year to year. It is a problem, no doubt, which will terminate as you say, the canals will have to be raised accordingly, about which there is no trouble or difficulty whatever. There is an abundance of fall, there being one

hundred feet fall from the intake in sixty miles, down to where the water is diverted at the present time from the main canal.

MR. DENNIS: What is the average deposit of silt on the farms?

MR. FINKLE: I was just stating in reply to the other gentlemen's question that tests made on some farms have shown a rise of one-eighth to one-quarter of an inch per annum. We do not have sufficient data to state what the average is for the entire valley.

PRESIDENT YOUNG: The Chairman of the Committee on Credentials is ready to report. His report is very short and will take a few minutes only.

MEMBERS OF THE COMMITTEE ON CREDENTIALS

The Members of the Committee on Credentials were:

Texas.....	J. A. Happer (Chairman).....	El Paso
Alberta.....	Walter Huckvale.....	Medicine Hat
British Columbia.....	James Johnston.....	Nelson
California.....	D. W. Ross.....	San Francisco
Colorado.....	W. A. Smith.....	Denver
Louisiana.....	W. T. Byrd.....	Baton Rouge
Michigan.....	C. W. Carman.....	Grand Rapids
Montana.....	W. A. Lamb.....	Helena
Saskatchewan.....	John Dixon.....	Maple Creek
Texas.....	W. L. Tooley.....	El Paso
Utah.....	J. W. Woolf (Secretary).....	Salt Lake City
Washington.....	E. A. Lindsley.....	Spokane

The report of the committee on Credentials was read by Secretary Hooker as Follows:

Report of COMMITTEE ON CREDENTIALS

Calgary, Alberta, Canada,
October 8, 1914.

To the Officers and Delegates of the
Twenty-First International Irrigation Congress:

Gentlemen:—

Your Committee on Credentials beg leave to report as follows: Attached hereto in alphabetical order, under provinces and states from whence they come, are all the delegates

who have presented their credentials and registered up to 10 a. m. this date; and your Committee recommend that this list be recognized as the Official Roster to serve as a basis of representation of the various states and provinces.

Your Committee recommend further that all delegates presenting proper credentials be added from time to time as they are registered at the Secretary's office.

Respectfully submitted,

(Signed) JOHN A. HAPPER.

Chairman.

W. A. WOOLF.

Secretary.

MR. HAPPER, Chairman of the Committee, on behalf of the Committee, I move the adoption of the report.

MR. W. D. BEERS, of Utah, I have much pleasure in seconding that motion.

The motion was thereupon put to vote, and carried.

Those registered at the Congress were:

United States

CALIFORNIA

F. C. Finkle.....	448 I. W. Hellman Bldg.....	Los Angeles
N. M. Manning.....	223 Linwood Avenue.....	Monrovia
L. A. Nares.....	Pres. Fresno Canal and Irrigation Co.....	Fresno
D. W. Ross.....	251 Kearney Street.....	San Francisco
Robert Schoeneman.....	1053 Locust Avenue.....	Long Beach

COLORADO

Kurt Grunwald.....	824 Equitable Bldg.....	Denver
L. F. Mowrey.....		Denver
Geo. M. Patterson.....	503 Ensign.....	Fort Morgan
Frank H. Perry.....		Grand Junction
W. A. Smith.....	934-17th Street.....	Denver

DISTRICT OF COLUMBIA

F. H. Newell.....	Director U.S.Reclamation Service....	Washington
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IDAHO

E. B. Darlington.....		Hollister
Mrs. E. B. Darlington.....		Hollister
I. L. Flagler.....		Emmett
G. E. Harlan.....		Twin Falls

ILLINOIS

M. Hettinger.....		Freeport
-------------------	--	----------

KANSAS

J. B. Case.....		Abilene
-----------------	--	---------

LOUISIANA

Wm. T. Byrd.....	853 Convention St.....	Baton Rouge
------------------	------------------------	-------------

MICHIGAN

C. W. Carman.....	701 Terrace Avenue.....	Grand Rapids
Mrs. C. W. Carman.....	701 Terrace Avenue.....	Grand Rapids

MONTANA

E. K. Bowman.....		Hardin
H. W. Brown.....		Cascade
W. A. Lamb.....		Helena
L. Newman.....		Great Falls
H. N. Savage.....	U. S. Reclamation Service.....	Great Falls
Joseph Wright.....		Fletcher

NEW YORK

T. W. Blodgett.....	717 Cayuga Street.....	Fulton
John R. Sibley.....	930 East Avenue.....	Rochester

OREGON

J. T. Hinkle.....		Hermiston
L. C. Keene.....		Corvallis
A. B. Thomson.....		Echo
Mrs. A. B. Thomson.....		Echo

TEXAS

John A. Happer.....	1423 Hawthorne Street.....	El Paso
C. A. Kinne.....		El Paso
J. C. Nagle.....	Capitol Station.....	Austin
W. L. Tooley.....		El Paso

UTAH

E. D. Ball.....	Experiment Station.....	Logan
W. D. Beers.....	321 Felt Building.....	Salt Lake City
Frank S. Harris.....	Experiment Station.....	Logan
Geo. Albert Smith.....	21 N. West Temple St.....	Salt Lake City
J. W. Woolf.....	744 South Fifth East.....	Salt Lake City
Richard W. Young.....	705 First Avenue.....	Salt Lake City

WASHINGTON

L. O. Armstrong.....	705 Sprague Avenue.....	Spokane
E. F. Benson.....	4224 N. Mason Avenue.....	Tacoma
E. C. Burlingame.....	427 Washington.....	Walla Walla
Mrs. E. C. Burlingame.....	427 Washington.....	Walla Walla
E. N. Chandler.....		Burbank
Marvin Chase.....		Richmond Beach
D. M. Drumheller.....	1321 Sixth Avenue.....	Spokane
F. H. Finley.....	2306 Pacific Avenue.....	Spokane
J. C. Graham.....		Palouse
Mrs. J. C. Graham.....		Palouse
Mrs. James H. Hoar.....		Tacoma
Arthur Hooker.....	E. 733 Indiana Avenue.....	Spokane
Mabel B. Hooker.....	E. 733 Indiana Avenue.....	Spokane
W. G. Hooker.....	E. 733 Indiana Avenue.....	Spokane
H. E. Hunt.....	Hotel Majestic.....	Spokane
R. Insinger.....	P. O. Box 2181.....	Spokane
E. A. Lindsley.....	611 Peyton Block.....	Spokane
C. C. Thom.....	606 Maiden Lane.....	Pullman
Mrs. C. C. Thom.....	606 Maiden Lane.....	Pullman

Dominion of Canada

ALBERTA

Charles F. Adams.....	721 Riverdale Avenue.....	Calgary
H. S. Allen.....		Raymond
H. O. Alden.....		Brooks
James H. Anderson.....		Cardston
Eugene Babcock.....		Gleichen
Henry H. Becker.....		Pincher Station
R. B. Bennett, M. P.....	Clarence Block.....	Calgary
F. V. Bennis.....		High River
J. Birtles.....		Monitor
Mrs. J. Birtles.....		Monitor
D. E. Black.....	323 Fifteenth Ave. W.....	Calgary
Melvin A. Blodgett.....		Empress
D. C. Blow.....	502 Fith Ave. W.....	Calgary
Dr. T. H. Blow, M. P.....	210 Seventh Ave. W.....	Calgary
W. R. Blow.....	212 Seventh Ave. W.....	Calgary
Oliver Blue.....	Department of Agriculture.....	Edmonton
P. Turner Bone.....	340 Fourth Ave. W.....	Calgary
C. George Bowlus.....		Blackie
George Brown.....	Demonstration Farm.....	Medicine Hat
P. M. Bredt.....	P. O. Box 2089.....	Calgary
Geo. F. Bryan.....	414 Fourth Ave. W.....	Calgary
P. Burns.....		Calgary
John C. Buckley.....		Gleichen
B. K. Bullock.....		Taber
Ralph J. Burley.....	P. O. Box 2318.....	Calgary
F. W. Burton.....		Strathmore
Mrs. F. W. Burton.....		Strathmore
Mrs. S. H. Burroughs.....	932 Twelfth Ave. W.....	Calgary
W. H. Berkinshaw.....	Manager W. R. Brock & Co.....	Calgary
Alexander Calhoun.....	1522 Sixteenth Ave. W.....	Calgary
J. W. Campbell.....	122 Eleventh Ave. W.....	Calgary
Mrs. F. T. Campbell.....	1512 Twelfth Ave. W.....	Calgary
D. G. Campbell.....	323 Thirty-eighth Ave. W.....	Calgary
J. Y. Card.....		Cardston
E. Carswell.....	614 Rideau Road.....	Calgary
Mrs. Carter.....		Edmonton
Miss Carter.....		Edmonton
L. D. Casey.....		Crossfield
J. Cook.....		Cochrane
Anna Chritcheley.....	714 Rideau Road.....	Calgary
J. T. Cooper.....		Nanton
A. H. Clarke.....		Calgary
J. G. Clark.....		Irma
Mrs. J. G. Clark.....		Irma
Charles Clark.....		High River
Joseph Cousins.....		Innisfail
S. L. Coy.....		Killam
Mrs. S. L. Coy.....		Killam
Geo. W. Craig.....	City Engineer.....	Calgary
F. W. Crandell.....		Gleichen
Mrs. F. W. Crandell.....		Gleichen
E. H. Crandell.....	2 Burns Block.....	Calgary
O. S. Chapin.....	323 Eighth Ave. West.....	Calgary
A. E. Cross.....	Pres. Calgary Brewing Co.....	Calgary
J. W. Davidson.....	305 Grain Exchange Bldg.....	Calgary
W. M. Davidson.....	Morning Albertan.....	Calgary
J. S. Dennis.....	Ass't. to President, C. P. R.....	Calgary

O. G. Devenish	302 Burns Block	Calgary
E. J. Dewey	P. O. Box 50	Calgary
R. A. Darker	Canada Life Assurance Co.	Calgary
N. B. Davis		Bassano
J. H. Dixon		Langdon
Charles Dodge		Strathmore
J. C. Drewry		Cowley
Samuel Drumheller		Drumheller
Hugh J. Duffield	1933 Twenty-fourth St. W.	Calgary
Harold Dun		Gleichen
W. C. Duncan		Olds
R. C. Edwards	Cameron Block	Calgary
W. Muir Edwards	University of Alberta	Edmonton
G. R. Elliott	1209 Thirteenth Ave. W.	Calgary
W. J. Elliott		Olds
J. H. Elliott		Irma
Jas. E. Ellison		Raymond
John M. Empey	340 Eighteenth Ave. W.	Calgary
A. W. Ellson Fawkes	2318 Second St. West	Calgary
W. H. Fairfield	Experiment Station	Lethbridge
P. A. Fetterly		Brooks
Stanley H. Frame	c/o City Engineer's Office	Calgary
Mrs. Stanley H. Frame	4236 Sixth St. West	Calgary
E. J. Fream	314 Loughheed Block	Calgary
C. M. Fry		Innisfrie
A. L. Fryberger		Bassano
T. A. P. Frost	2407 Seventeenth St. W.	Calgary
W. J. Gale	1717 Twenty-seventh Ave. W.	Calgary
J. H. Garden	630 Elgin Avenue	Calgary
Mrs. J. H. Garden	630 Elgin Avenue	Calgary
W. N. Gibson	1239 Sixteenth Ave. W.	Calgary
W. H. Gilson		Lacombe
J. R. Good		Didsbury
Mrs. J. R. Good		Didsbury
R. H. Goodchild	P. O. Box 2318	Calgary
Julius Goldberg	130 Kennedy	Edmonton
R. J. Gordon	Parliament Buildings	Edmonton
A. M. Grave		Lethbridge
Geo. W. Green	1016 Seventh Ave.	Lethbridge
J. F. Green	Calgary Industrial Exhibition	Calgary
F. S. Grisdale		Olds
Joseph E. Hauffer		Didsbury
Mrs. Jos. E. Hauffer		Didsbury
L. Hammer		Olds
W. Harvey		Olds
D. E. Harris	Lethbridge Hotel	Lethbridge
Geo. Harcourt	Department of Agriculture	Edmonton
Simeon Hansen		Suffield
N. N. Hayes		Gleichen
R. B. Hayes		Gleichen
D. W. Hays	Southern Alberta Land Co.	Medicine Hat
E. R. Henny		Coronation
H. Henay	Department of Agriculture	Edmonton
W. F. Hicks		Lethbridge
Rev. S. B. Hillocks	229 Third Ave. N. E.	Calgary
Bert Huffman	Natural Resources Dept., C.P.R.	Calgary
J. Tait Hunter	418 Tenth Ave. N.W.	Calgary
C. B. Hornby		Calgary
G. N. Houston	909 Thirteenth Ave. W.	Calgary
Walter Huckvale	251 First Street	Medicine Hat
George G. Huser		Crossfield
Geo. Hutton		Lacombe

G. H. Hutton	Experimental Farm	Lacombe
R. J. Hutchings	Pres. Great West Saddlery Co.	Calgary
J. A. Irvine	201 Leeson & Lineham Block	Calgary
Mrs. J. A. Irvine	201 Leeson & Lineham Block	Calgary
F. S. Jacobs	405a Eighth Ave. W.	Calgary
P. J. Jennings	320 Twenty-fifth Ave. W.	Calgary
J. B. Johannsen		Standard
Guy W. Johnson		Provost
J. H. Jones	301 Twenty-fifth Ave. W.	Calgary
Dr. G. W. Kerby	President Mount Royal College	Calgary
Mrs. G. W. Kerby	Mount Royal College	Calgary
Arthur Kemp		Shepard
Harry Kent	405 Fifteenth St. N. W.	Calgary
Richard Knight		Priddis
Ole Kirkwold	Natural Resources Dept., C.P.R.	Calgary
William Kirkup		Gleichen
Hon. J. A. Loughheed	Clarence Block	Calgary
George Lane	Fourth Avenue West	Calgary
Thomas Laycock		Calgary
E. B. Langdon	Third Street East	Olds
Mrs. E. R. Leverton	1919-25a Street West	Calgary
H. W. Love		Irma
A. W. Lowrey		Calgary
Andrew Miller	Industrial Commissioner	Calgary
C. P. Marker	17 Crown Building	Calgary
H. B. Muckleston	Natural Resources Dept., C.P.R.	Calgary
J. M. Miller	City Clerk, City Hall	Calgary
C. S. Mahood, M. D.	734 Sunnyside Boulevard	Calgary
G. R. Marnoch	President Board of Trade	Lethbridge
M. H. Marshall	1509 Tenth Ave. West	Calgary
O. Matthews	Dominion Experimental Farm	Lethbridge
W. E. Mills		Wainwright
Chas. T. Mitchell		Bassano
H. H. Moore	I. O. O. F. Block	Calgary
J. W. Mitchell	1319 Second Street East	Calgary
James Murray		Suffield
F. D. Murchison		Bassano
D. O. McHugh	Grain Exchange Building	Calgary
Arch. McKillop	601 Eleventh Ave. West	Calgary
J. P. McArthur, M.P.P.	123 Third Ave. West	Calgary
J. J. McDonald	P. O. Box 258	Calgary
Mrs. J. J. McDonald	P. O. Box 258	Calgary
D. McEachen		Cochrane
A. J. McLean		Edmonton
W. C. McGinnis	c/o James Richardson & Sons, Grain Exchange Building	Calgary
W. A. McGregor	c/o Southern Alberta Land Co.	Medicine Hat
T. T. McKee		Drumheller
J. E. McKenzie	528 Fifth Street West	Calgary
Mrs. McKenzie		Edmonton
L. McKinnon		Langdon
J. C. McLeod	140 Fourth Ave. West	Calgary
E. B. McLean	1116 Second Street N. E.	Calgary
F. D. McNaughton		Bassano
Mrs. F. D. McNaughton		Bassano
J. W. McNicol		Lethbridge
P. L. Naismith	Dept of Natural Resources, C.P.R.	Calgary
W. H. S. Nelson	513 Eighth Ave. West	Airdrie
J. C. Nelson		Carseland
W. Nelson		Airdrie
A. C. Newcombe	1315 Fifteenth St. N. W.	Calgary
Mrs. A. C. Newcombe	1315 Fifteenth St. N. W.	Calgary

Mrs. E. P. Newhall	827 Third Ave. West	Calgary
A. S. Nimmo	515 Twenty-second Ave. W.	Calgary
Mrs. A. S. Nimmo	515 Twenty-second Ave. W.	Calgary
Mrs. P. J. Nolan	808 Twentieth Ave. West	Calgary
C. G. K. Nourse	Mgr. Canadian Bank of Commerce	Calgary
G. S. Orde	Mgr. Union Bank of Canada	Calgary
William Pearce	Dept. of Natural Resources, C.P.R.	Calgary
F. H. Peters	513 Eighth Ave. West	Calgary
Mrs. F. H. Peters		Calgary
A. W. Pryce-Jones	1139 Riverdale Ave.	Calgary
P. Pallesen	718 Third Ave. West	Calgary
Gilbert H. Patrick	P. O. Box 224	Strathmore
Mrs. G. H. Patrick	P. O. Box 224	Strathmore
Harry W. Pattin		Bassano
David Pearson		Carstairs
Robert Pearson	Y. M. C. A.	Calgary
Arthur Perrev	St. Mary's Ranch,	Cardstan
Clement W. Perry	Cecil Hotel.	Calgary
Frank Peterson		Carstairs
J. H. Peterson		Acme
A. E. Peterson		Sterlingville
Charles S. Pingle	444 Fourth Street	Medicine Hat
Sam G. Porter	2206 Fourth Street West, Suite 14	Calgary
J. Quinsey		Nobleford
Harold W. Riley	224 Eighth Ave. West	Calgary
B. L. Robinson	2nd Street and 7th Ave. W.	Calgary
E. L. Richardson	Victoria Park	Calgary
Norman S. Rankin	Dept. of Natural Resources, C.P.R.	Calgary
Dr. J. G. Rutherford	Dept. of Natural Resources, C.P.R.	Calgary
W. R. Reader	Calgary Industrial Exhibition	Calgary
P. R. Reed		Didsbury
H. Reeve		Wainwright
L. M. Roberts	Lougheed, Bennett, McLaws & Co.	Calgary
J. P. Robinson		Calgary
Mrs. J. P. Robinson		Calgary
Thomas Robinson		Strathmore
Geo. Roumanes	City Engineer's Office.	Calgary
I. G. Ruttle	333 Fourteenth Ave. West	Calgary
Capt. Jas. Smart	6th Avenue and 1st St. E.	Calgary
Mayor H. A. Sinnott	City Hall	Calgary
L. P. Strong	406 Grain Exchange Bldg.	Calgary
H. A. Samis		Olds
Robert B. Sangster		Brooks
P. M. Sauder	520 Twenty-third Ave. W.	Calgary
Mrs. P. M. Sauder	520 Twenty-third Ave. W.	Calgary
A. R. Schrag	1208 Fifth St. West	Calgary
Mrs. A. R. Schrag	1208 Fifth St. West	Calgary
H. D. Schutt	1727 Thirteenth Ave. West	Calgary
William Sharp		Lacombe
H. H. Shaw		Gleichen
R. W. Shaw		Millarville
H. M. Shaw		Nanton
James Shouldice	Shouldice Park	Calgary
H. Sidenius	Natural Resources, C.P.R.	Calgary
Mrs. P. W. Simons	1012 Fourteenth Ave. West	Calgary
Mrs. H. A. Singley	1730 Eleventh St. West	Calgary
J. D. Smith	Department of Agriculture	Edmonton
Geo. W. Smith	Gaetz Avenue	Red Deer
Mrs. T. E. E. Smith		Olds
R. C. Spitzer	237 Fifteenth Ave. W.	Calgary
Thos. E. Smith		Olds
A. Snider		Langdon

Henry Sorensen.....	P. O. Box 1.....	Strathmore
Robert Spencer.....	Calgary Industrial Exhibition.....	Calgary
W. H. Steed.....	.....	Cardston
W. J. Stephen.....	.....	Claresholm
W. F. Stevens.....	732 Twenty-first Street.....	Edmonton
Thomas Stevenson.....	111 Devenish Apartments.....	Calgary
Mrs. Thos. Stevenson.....	111 Devenish Apartments.....	Calgary
John Stevenson.....	.....	Claresholm
Robert S. Stockton.....	Supt. of Operations, C.P.R.....	Strathmore
J. Stocks.....	.....	Edmonton
Mrs. J. M. Strieb.....	.....	Calgary
Frank E. Sugden.....	.....	Cheadle
Mrs. Frank E. Sugden.....	.....	Cheadle
Wm. P. Sutton.....	603 Thirteenth Ave. W.....	Calgary
T. A. Sundal.....	.....	Taber
A. A. Swartz.....	937 Fifteenth Ave. W.....	Calgary
J. A. Symes.....	716 Rideau Road.....	Calgary
Mrs. J. A. Symes.....	716 Rideau Road.....	Calgary
E. N. C. Tanguay.....	.....	Wainwright
P. Talbot.....	.....	Lacombe
E. B. Tainter.....	.....	Taber
Nick Taitinger.....	.....	Claresholm
J. S. Tempest.....	923 Fourteenth Ave. W.....	Calgary
W. D. Trego.....	.....	Gleichen
Sydney O. Tregillus.....	525 Thirteenth Ave. W.....	Calgary
W. J. Tregillus.....	434 Lougheed Bldg.....	Calgary
G. M. Thompson.....	The News Telegram.....	Calgary
T. M. Tweedie, M.L.A.....	105a Eighth Av. West.....	Calgary
J. A. Valiquette.....	732 Twelfth Ave. West.....	Calgary
C. A. Van Scay.....	C. P. R. Sales' Department.....	Calgary
B. S. White.....	Editor Western Standard.....	Calgary
J. A. Walker.....	Mgr. Royal Bank of Canada.....	Calgary
Wm. J. Wacker.....	.....	Swalwell
R. A. Wallace.....	P. O. Box 68.....	High River
Colonel Walker.....	35 Lincham Block.....	Calgary
G. D. Walters.....	P. O. Box 2318 Dept. of Interior.....	Calgary
Mrs. G. D. Walters.....	12 Aberdeen Apartments.....	Calgary
W. Brooks Waters.....	803 Eighteenth Ave. West.....	Calgary
Mrs. W. Brooks Waters.....	803 Eighteenth Ave. West.....	Calgary
George Wells.....	502 Twenty-second Ave. W.....	Calgary
Fred B. White.....	.....	Swalwell
R. J. G. White.....	1933 Twenty-seventh St. W.....	Calgary
James Williamson.....	P. O. Box 1510.....	Calgary
William H. Willson.....	Secretary Board of Trade.....	Calgary
H. C. Wingate.....	.....	Cayley
P. H. Wilkinson.....	.....	Brooks
Sterling Williams.....	.....	Cardston
August Wolf.....	.....	Edmonton
P. P. Woodbridge.....	1426 Boulevard, Hillhurst.....	Calgary
J. H. Woods.....	Herald Building.....	Calgary
Martin Woolf.....	.....	Cardston
Mrs. Wolley Dod.....	616 Thirtieth Ave. West.....	Calgary
W. H. Young.....	914 Fifteenth Ave. West.....	Calgary

BRITISH COLUMBIA

W. R. Austin.....	Healey Creek P. O.....	Kamloops
Frank Brandrith.....	Department of Agriculture.....	Victoria
H. B. Burtch.....	.....	Kelowna
Arthur Chamberlin.....	136 Battle Street.....	Kamloops
E. M. Dann.....	.....	Kamloops
F. R. E. deHart.....	.....	Kelowna

Dr. Chas. W. Dickson		Kelowna
George H. Dickson	907 Vancouver Block	Vancouver
J. C. Dufresne		Penticton
A. Edward		Kelowna
H. W. Grunsky	Water Rights' Branch	Victoria
James Johnston	P. O. Box 198	Nelson
Mrs. James Johnston	P. O. Box 198	Nelson
L. S. Klinck	198 Hastings St. West	Vancouver
E. W. Kraft	1128 Homer Street	Vancouver
W. A. Lang	Department of Agriculture	Victoria
C. E. Laurence	545 Victoria Street	Kamloops
D. M. LeBourdais		Barkerville
N. F. McDiarmid		Ladner
Geo. B. McDermot		Golden
A. D. Paterson		Ladner
Henry Peters		Enderby
W. H. Pottruff		Revelstoke
J. G. Robson	784 Hamilton Street	New Westminster
George Sangster	P. O. Box 705	Victoria
William E. Scott		Victoria
J. Sewell		Penticton
J. Forsyth Smith		Victoria
W. E. Smith		Revelstoke
R. G. Swan	249 Hastings St. E.	Vancouver
Arthur L. Tregillus		Barkerville
F. F. Westbrook	University of British Columbia	Vancouver
J. Kerr Wilson, M.D.	Main Street	Ladner
William Young	Comptroller Water Rights'	Victoria

MANITOBA

S. Benson		Winnipeg
John Hamilton		Kelwood
M. C. Hendry	231 Chambers of Commerce	Winnipeg
J. Bruce Walker	Dominion Immigration Agent	Winnipeg
W. C. McKellican	Dominion Seed Branch	Brandon

NOVA SCOTIA

Rev. Ronald Beaton		Antigonish
Mrs. C. F. Shares		Inverness

ONTARIO

J. B. Challies	Water Power Branch, Dept of Interior	Ottawa
E. F. Drake	Department of the Interior	Ottawa
J. B. Spencer	Department of Agriculture	Ottawa

SASKATCHEWAN

W. H. Bryce		Arcola
John Dixon		Maple Creek
C. E. Flatt		Tantallon
S. A. Greer	P. O. Box 321	Moosejaw
G. S. Herring		Maple Creek
A. F. Mantle	Department of Agriculture	Regina
Hugh McKellar	38 Stadacona St. West	Moosejaw
R. Patton	Board of Trade	Moosejaw
J. W. Redgwick		Melville
W. J. Rutherford	University of Saskatchewan	Saskatoon
Wil. James Thompson	Felicia Park Farm	Saskatoon
Albert H. White		North Battleford
R. G. Williamson		Maple Creek

Australia

Niel Nielsen.....419 Market Street.....San Francisco

Russia

Peter P. Von Weymarn...Ministry of Agriculture.....Petrograd

SECRETARY HOOKER: The Executive Committee, one member each of which is appointed by the state and provincial delegations, for the following year, has been called to meet on the platform of this hall at the conclusion of the afternoon meeting of the Congress. State delegations should see that their Executive Committee man is informed and is present at that meeting.

PRESIDENT YOUNG desires it announced that W. D. Beers, of Utah, and William Young, of British Columbia, are appointed members of the Resolutions Committee by the Board of Governors, under the provisions of the Constitution.

GREETINGS FROM "LUCILLE THE FIRST."

We have a message of greeting from "Lucille the First," who was Queen of the Irrigation Congress preceding this one at Salt Lake City. Her message reads as follows:

"Lucille The First—who enjoyed the honour of being Queen at the Twentieth Convention of the Irrigation Congress held in Salt Lake City, Utah, two years ago—takes the liberty of sending to the Irrigation Congress convened at Calgary, Canada, through its able and distinguished President, Major Young, greetings and best wishes for a most successful session, on this its Twenty-First Anniversary.

"All of the undertakings of the Irrigation Congress are dear to the heart of their erstwhile queen; and she earnestly hopes that this meeting may realize the fruition of the most cherished plans of that worthy body.

"She also recalls with great pleasure her acquaintances of two years ago, and she invokes the kind offices of kismet to afford a speedy opportunity for renewal of the many delightful friendships started at that time.

"September Thirtieth
Four Cummings Apartments.
Salt Lake City, Utah. U. S. A. (Applause.)"

CHAIRMAN CASE: Those of you who were present at the opening of the Congress at Salt Lake City will certainly remember the Queen. The opening of that Congress, at which Senator Newlands presided, was in the Tabernacle, filled with

ten or twelve thousand people, and it was certainly a beautiful sight.

I have the pleasure to present to you the President of the Washington Irrigation Institute, gentlemen, who was a pioneer in the upbuilding of Washington, Mr. E. F. Benson. (Applause.)

Address by

E. F. Benson

President Washington Irrigation Institute

IRRIGATION CONDITIONS IN THE STATE OF WASHINGTON

Mr. Chairman, Ladies and Gentlemen:

I notice on the programme that the next discussion is the Call of states and provinces, and five minute talks by the representatives of states and provinces. The state of Washington is very pleased to be able to discuss its affairs without this restriction, but it would be out of place to discuss our proposition only, while the other provinces and states are restricted to five minutes. In the interests of conserving your time I trust you will pardon reading what little I have to say.

Irrigation Conditions in the State of Washington—a very dry and uninteresting subject if discussed only from an advertising or boosting standpoint.

But a brief statement of some irrigation conditions and difficulties, and how we are trying to overcome them, might be of interest to those of you who are similarly situated.

Practically all the irrigable lands, in our state, lie east of the Cascade Mountains, where the annual precipitation varies from five to nine inches in different parts of the Yakima Valley and along the Columbia river, to sixteen inches on the Spokane prairies and some of the higher valleys.

In the western part of the state, in the Puget Sound district, where the yearly rain-fall is forty inches or more, irrigation would not be expected, but during the summer months the gardens and berry fields, even on the rich bottom lands, frequently need irrigation, especially during an unusually long dry season such as last summer, when no rain fell for seventy-five days at one stretch.

But the gravelly prairies, even in western Washington, must be regularly irrigated to produce much, and there is already some pumping from wells and creeks, and even gravity canals are being built. This does not refer to that district west of the Olympic range, along the Pacific Ocean, where the rain-fall at one point is about ten acre feet each year.

This discussion, therefore, refers, almost entirely to *conditions in eastern Washington* where more than 400,000

acres are under irrigation works and over 300,000 acres are actually irrigated and cultivated.

Much progress has been made in irrigation development, both before and since the U. S. Reclamation Service began its activities in 1906.

Most of the government work in our state has thus far been done in the Yakima Valley, where there is more land than water. Large storage works are being constructed in the mountains.

The present plans when fully worked out, will cost about \$15,000,000 and store over one million acre feet yearly.

These works not only assure ample water for existing canals, which now irrigate about 300,000 acres, but make provision for the irrigation of 400,000 acres of additional land in this one valley.

Other large areas in the state, for which irrigation is being earnestly sought, are the Horse Heaven, the Palouse project and the Quincy Valley district, amounting in all to about 800,000 acres.

Altogether one and one quarter million acres of dry land, in the state of Washington, are under consideration for irrigation, with no *present* prospect of anything being done, unless, through some district organizations, Federal aid can be secured.

AS TO CROPS

Very little of the irrigated land in Washington is devoted to small grains. Fruits, hops, potatoes, and alfalfa, with its accompanying live stock, are the chief productions, but the increasing number of milk cows and hogs, is stimulating corn production to an extent not dreamed of, a few years ago. A Washington farmer won the sweep-stakes at the Dallas Corn Show, Texas, last winter, and the corn production for the state this year is estimated at 1,000,000 bushels. Under one irrigation project a careful crop census, taken after the 1913 crop was harvested, showed that 4,516 acres in corn produced 225,000 bushels, an average of fifty bushels per acre.

It may be of interest to know that this project containing 100,000 acres has, most of it, been watered for the past twenty years, that 58,300 acres is the total area irrigated up to this season; that 46,230 acres was the total area cropped during the season of 1913; that the market value of crops produced that year was \$2,820,786, an average of a little over \$61.00 per acre.

The fruit business became so profitable a few years ago, that exaggerated prices prevailed for orchards and orchard lands. \$1,000 an acre for orchards and \$300 to \$400 an acre for unimproved lands, in the most desirable districts were the rule and not the exception, and as high as \$2,500. an acre

has been paid in the different valleys for improved orchards, and a few deals were made at much higher prices.

Such sales were widely heralded and prospective immigrants to our irrigated prairies went elsewhere to find cheaper lands.

The hopes of the land booming speculator went glimmering as year after year the crop of immigrants failed to come.

Meantime the farmers who have been growing alfalfa, milking cows and feeding hogs, have noticed no depreciation in the earnings of their farms.

Even the fruit men, with the two exceptionally poor years for prices (1912 and 1914) have done as well as they ever did and many of them still insist that the lands never were priced too high and that occasional sales, now being made at less than twenty-five to fifty per cent of the prices which prevailed three to six years ago, will come back in the very near future.

This illustrates the absolute falsity of that much talked of and generally believed rule that "Land value depends on its Earning Capacity."

That was the rule which justified the fruit land prices of \$2,000 to \$5,000 an acre.

Some of the actual returns to many of the best growers, not merely for one year, but during a term of years, sound like "Arabian Nights" stories, and anyone repeating such tales is classed as a worthy successor of Baron Munchausen.

Some one will ask, "What possible rule for land values can you invoke, if you refuse to admit that its earning *possibilities* are the one true index of its value." It is the earning ability of the land as it is farmed by the common or *average* farmer, but not as it is farmed by the specialist, or the unusually successful manager, that gives the fair test of land value.

In the matter of bringing up the ability of the farm operator to the point where his efficiency and farming successes make his land more valuable, the state of Washington is making good progress.

It is quite generally conceded that maximum results are very seldom secured; that we do not know whether we are irrigating too little or too much, or at improper times, for many of the crops that should be very profitable; that some sort of rotation system is better for both the water user and the ditch company, than the continuous flow throughout the season; that ideal soil conditions for some crops frequently require certain soil building crop rotating practices to make farming most successful; and the fact that our people do realize these shortcomings and the need of more experimentation in these realms, and are striving to solve the numerous irrigation problems, makes us all hopeful of results in the near future.

Anybody can grow alfalfa in our country and harvest four or five tons per acre, at three cuttings of fairly good hay, but everybody can not or *does not* now grow eight or nine tons of first quality alfalfa per acre. A few farmers do, but the great majority do not.

Occasionally a man grows potatoes exceptionally well, both as to quantity and quality, but most of our growers either get a poor stand or for some other reason get only a quarter of a crop.

Alfalfa seed is produced with profit in nearly every alfalfa growing district from Northern Montana to Southern Arizona, yet our alfalfa growers in Washington, either haven't learned how, or else they haven't gotten into the habit, for we ship in practically all the seed we use.

Some farmers produce reasonably good crops with a small quantity of water, while others use or waste enormous quantities, out of all proportion to their real needs.

I know of one five acre tract mostly in young orchard just coming into bearing that was watered last year with twenty-seven acre inches. The owner was entitled to more and could have had it without extra cost, but made a good showing with that quantity.

A near neighbour to him, on a ten acre tract of similar soil, partly in young orchard and partly in alfalfa used 185 acre inches, and did not get a very good result either. Similar instances can be found under every project.

Some people in our state have been irrigating a long time and making all the success we could wish, but we have many new settlers on our irrigated farms who need helpful suggestions and aid from their neighbours as well as from the County Agricultural expert, the Agricultural College and the Department of Irrigation Investigations at Washington, D. C.

Our State Agricultural College is doing splendid work.

It is located in one of the best wheat countries on earth, in the famous Palouse country, but it is too far away from any of the irrigated districts to solve many of the irrigation problems.

We have an experiment station in western Washington, connected with the State College, which has abundantly justified its creation, and a very general sentiment prevails in favour of a similar experiment station to be established in some one of the irrigated valleys of our state, to help us, and incidentally to help all of you, to get the best results from our irrigated lands; to introduce many profitable crops that are now overlooked, and to improve methods now in use.

We have felt the need in our state of organizing what has been called the "Washington Irrigation Institute" to help the irrigation farmer, the canal manager, the engineer, and to help to enlighten the public regarding every phase of irriga-

tion. We had a most helpful, enthusiastic and splendid meeting a year ago at North Yakima and our next meeting will be held there December 16th, 17th and 18th. Everyone interested in the broad subject of irrigation from any view point, is cordially invited to attend and participate in the discussions, regardless of what state or province he may hail from.

We are doing what we can to correct the erroneous impression, altogether too prevalent, that farming generally and especially irrigation farming is less honourable or less profitable or less desirable than the city life.

If the Garden of Eden was as much of a paradise as we are led to believe, it most certainly was *irrigated*, and the water of life is making our state, as well as many other states, a veritable Garden of Eden.

Before much progress can be made in the direction of providing happy homes for the millions, public sentiment must be developed along the ideas of:

1st "Back to the Land."

2nd: "The responsibility of every land owner for the sacred trust of land ownership", that he shall get the same into a producing condition in a reasonably short time.

3rd: "The making and using the by-products of the farm, orchard and garden."

4th: "The production of live stock."

5th: "Improving market facilities."

In short, getting the maximum results from the land.

Population in America is increasing much more rapidly than food production, and the man who, with industry and intelligence, prepares to feed the people will be sure of reasonable returns for his labour.

If we would hear about "The High Cost of Living" and the evils and hardships incident to the great congestion of population in our large cities, we must help the irrigation farmer to make the most of his opportunities, and get more lands under water and more farmers on those lands.

In this we cannot go wrong, unless by deliberate exaggeration in representing the future of our irrigation districts.

It is the province of this "International Irrigation Congress" and similar state and district associations, as well as commercial clubs and chambers of commerce throughout the country, to awaken and direct a correct public sentiment and, until that is done, vast areas of fertile land will continue to remain un-irrigated, because the first and basic reason for building a canal is that the land is needed and will be speedily put under cultivation.

The individuals, the organization and institution, and the public officials who aid and encourage such development, are

engaged in the greatest economic and philanthropic work of this generation.

They are laying the foundation for local and national prosperity, and helping to create thrifty rural communities and individuals, the surest foundation of good citizenship. (Applause).

MR. DENNIS: Mr. Chairman, I would like to ask Mr. Benson one question. He incidentally deals with what, after all, is at the foundation of success of all irrigation projects and that is the value of the land. I understand he takes the ground that it is not a fair proposal to sell land based on a valuation of a reasonable percentage of return. May I ask Mr. Benson to give us his ideas as to what he considers a fair basis to adopt by an individual, or a corporation or a government in inviting the settler from anywhere in the world to take up an irrigated farm.

MR. BENSON: Evidently Mr. Dennis overlooked the distinction I made, and that was that the usual valuation is based on a certain particular tract in the project, therefore proving conclusively that the land is worth \$1,000 to \$5,000 an acre. My contention is that this is absolutely unfair, because we are dealing with *averages*; you have to take the result of the average and not the result of the extraordinary farm. Now under one of the Yakima Valley projects, a man came in a few years ago and paid \$40,000 for thirty-two acres. Across one end of the tract he had a row of beautiful d'Anjou pear trees. That row of trees occupied between three-quarters of an acre and one acre. The net returns from that one row of pears has paid that man, according to his statement, five per cent on his \$40,000 investment from the day he bought the place till now. Now for any one to say that that land is worth \$50,000 an acre is ridiculous therefore it is the average that you must rely on and not a particular individual, or the extraordinary production of some small tract.

MR. DENNIS: Raising diversified crops?

MR. BENSON: Raising anything you may wish.

MR. D. W. ROSS, of California; How do you propose to maintain this average value in order that justice may be done to the average man and not over-capitalize the industry of agriculture?

MR. BENSON: My answer to that will be if any one will go over a project he will soon find out what a farmer is getting, he will very soon find out the specialist too, the market gardener, and the man who is producing some special crop in a scientific way. My hope is to *raise* the general average and thereby increase the value of your land.

MR. W. R. AUSTIN, of British Columbia: When does one get seed from alfalfa, the first or the second crop?

MR. BENSON: I am one of those fellows who does not know how, coming from Washington. I will have to refer you to one of those seed-growers from Montana to Arizona.

MR. GEORGE G. HUSER, of Alberta: I have been a resident of Washington for twenty-five years and I have two farms there now. I am conversant with climatic conditions and the soil and the different crops. I have seen the great success of the irrigation projects. I am located thirteen miles north of Calgary and we have a rain-fall of seventeen inches. We have not very rich soil up there. It is rolling soil and, is it your honest opinion that this soil and these climatic conditions are adapted to irrigation or not? I rose before and asked this question but was not answered.

MR. BENSON: It would be hardly fair for me to try to pose as an expert in your district here, because I do not know it. If you ask me questions about Washington, I will tell you all that I know. I think you will have to look for an answer to your question from some one who knows your conditions better than I do.

MR. HUSER: That is the trouble, I have been able to raise seventy bushels of oats this year from experience gained in dry-farming in Washington. Now I contend that this C. P. R. irrigation project alongside of us here is a complete failure.

MR. C. C. THOM, of Washington: I have been very much interested in the price of land. I have letters coming from Idaho, British Columbia, and Alberta, and I have people who are looking for farms in the West. They get these pamphlets. I have stacked up against these pamphlets myself and I have called them facts and fancies. That is a new idea which is going on all over Canada and the western states and we are getting at the ability of the average farmer to make returns of certain valuations, to have these fellows collect figures, and we have some very interesting results from farm management and farm returns. In time we will be able to give the exact figures of everything, and that is what we want.

MR. E. C. BURLINGAME, of Washington: I have visited four or five of the Irrigation Congresses, Idaho, California and so on, and this is the first place I have ever visited where I found such difference of opinion between people who are crazy to irrigate and people who do not want to irrigate. There is an old adage which says, "You can lead your horse to water but you cannot make him drink." The time will come when those horses will want to drink. The thing seems to me to let those fellows who want to drink take

a drink and let the other fellows go without their drink if they do not want it (Applause).

MR. SORENSEN: But, Mr. President, would you force a horse to pay for a drink that he does not want. (Applause).

CHAIRMAN CASE: To our Canadian friends I would say we have gone through very much of these experiences down in the states. I think you will all see the time when a little water will do a good deal of good.

Now for this evening we have changed the programme and the first speaker will be Dr. J. G. Rutherford, Superintendent of Animal Husbandry of the Canadian Pacific Railway. This afternoon is the concluding afternoon, and we will meet at 2:30 o'clock and I trust you will meet here promptly. We have the report of the Committee on Resolutions, discussion of the resolutions and the Call of states and provinces with five minute talks by representatives of state delegations. Now down in the United States the Call of states is very interesting. Each person tells what good things he can in five minutes about his state and I presume that you all have some good features about your states and provinces.

Mr. Dennis has a word to say to you.

MR. DENNIS: Mr. Chairman, I am desired by the Board of Control to announce that owing to the attention which the Exhibition or the Exhibits have attracted, that, instead of closing them to-morrow, it is intended to carry them over for a further day. Most of the members of the Congress will be absent to-morrow on our trip to Bassano, but at the request of some of the citizens of Calgary we have decided to continue the Exhibit for a further day. The Exhibits will therefore be carried through one day longer and open to the public as usual, free.

MR. H. B. MUCKLESTON, of Alberta: There has been a great deal of interest aroused among the engineers who are here as delegates to the Congress in the construction of the head-work and intake for the Western Section of the C. P. R. Block, and a great many of them have expressed a desire to visit it. There was no arrangement made in the programme of the Congress for a visit to the structure, but if the engineers who wish to see the structure will meet me at the Palliser Hotel this afternoon about 2:30 o'clock I shall be very glad to go over with them and look over this structure and explain to them the different functions of the different parts.

MR. DENNIS: One other point. There has been some uncertainty in the minds of certain delegates from the South as to whether they would be able to get back from Bassano to-morrow evening in time to take the train for the South. I am endeavouring to arrange our schedule in such a way that

they will be able to get back in time to take the train for Lethbridge and we shall be able to make a definite announcement after luncheon.

MR. C. E. LAURENCE, of British Columbia: Mr. President: During every session you have made a very strenuous appeal to delegates to be punctual at the next session. There is another thing which might have had a desirable effect which you did not state and that is that gentlemen who come strolling in half an hour after time are very disrespectful to the Chair.

CHAIRMAN CASE: Yes, I agree with you. Now this is the last day gentlemen, and I think this afternoon's programme is one which you will carry home with you and remember all the days of your life. We will now adjourn until 2-30 P. M.

TENTH SESSION

THURSDAY, OCTOBER 8, 1914

2.30 o'clock p. m.

PRESIDENT YOUNG: The Congress will now be in order.

Is Mr. William Young, of British Columbia in the audience? There is a telegram for him.

The first order of business this afternoon is the report of the Resolutions Committee of which Mr. Hinkle, of Oregon, is Chairman and Mr. Thompson, of Saskatchewan, is Secretary. The report will be read by Mr. Thompson.

MR. THOMPSON: Mr. Chairman, Ladies and Gentlemen: You might permit me, Mr. Chairman, to make a short preface to our report here by stating, for the benefit of those of you who are farmers, that the gentle spirit moving through all these resolutions, or the main part of them, is the proposition of getting a little closer to the farmer, not to preach above his head, but to utilize all the forces, legislative and public of every kind, to get down along side of him and help him. The report of the Committee is as follows:

REPORT OF THE COMMITTEE ON RESOLUTIONS

Calgary, Alberta, Canada,
October 8th, 1914.

The International Irrigation Congress:

Your Committee on Resolutions met and organized on October 7th.

The meeting was called to order by the temporary Chairman, Mr. J. T. Hinkle, and the following members found in attendance:—

MEMBERS OF THE COMMITTEE ON RESOLUTIONS

J. T. Hinkle, Chairman.....	Oregon
William Young {	Appointed by British Columbia
W. D. Beers {	Board of Governors Utah
P. J. Jennings.....	Alberta
Dr. C. W. Dickson.....	British Columbia
D. W. Ross.....	California
Frank H. Perry.....	Colorado

J. B. Case.....	Kansas
W. H. Byrd.....	Louisiana
T. W. Carman.....	Michigan
W. A. Lamb.....	Montana
Wm. J. Thompson, Secretary.....	Saskatchewan
J. A. Harper.....	Texas
F. S. Harris.....	Utah
Marvin Chase.....	Washington
F. H. Newell.....	District of Columbia
G. E. Harlan.....	Idaho
A. B. Thomson.....	Oregon

Mr. William J. Thomson was elected temporary Secretary; and on motion duly made and seconded, the temporary Chairman and Secretary were made permanent Chairman and Secretary.

RESOLUTIONS

Your Committee on Resolutions respectfully report as follows*

CONSOLIDATION OF INTERNATIONAL IRRIGATION CONGRESS WITH INTERNATIONAL DRY FARMING CONGRESS

RESOLVED that we favour the federation of the International Irrigation Congress and the International Dry-Farming Congress, and to that end, direct the Board of Governors of this Congress, either as a body or by sub-committee, to work with a like committee from the International Dry-Farming Congress for the purpose of arranging and planning details for the amalgamation of the two Congresses; the Board of Governors to report its conclusions and recommendations to this Congress at its next session.

IRRIGATION DISTRICTS

RESOLVED that we recommend the passage by Congress of an act authorizing the Secretary of the Interior to enter into contracts with irrigation districts created under state law, by which the responsibility and control of each reclamation project arising from the Reclamation Act of June 17th, 1902 may be turned over to an irrigation district organized under said law; and in the case of the inter-state projects, we recommend that suitable Federal laws be enacted by which inter-state irrigation districts may be formed; and in order that Federal projects may be turned over to the landowners, as contemplated by the Reclamation Law, we recommend the

*]See also separate resolution adopted at this session, after the adoption of the Report of the Committee on Resolutions.

careful revision and unification of irrigation district acts by the states of the arid regions, to the end that such projects may be turned over to the control of the settlers through such agency.

FINANCIAL SAFEGUARDS

RESOLVED, that full examination be made by experienced engineers in the employ of the national, states and Federal governments in advance of financing the construction of each large irrigation project, and that no such enterprise be entered upon by the governmental agencies unless it appears that such projects can return at least three per cent of the total investment for land and construction.

FEDERAL CONTROL OF INTER-STATE WATERS

We hold that Federal control as between those states which are not in full possession of their natural resources is essential to the equitable distribution and utilization of the waters of inter-state streams.

RIVER REGULATIONS

We commend the efforts by the United States Congress to create a Board of River Regulation, and urge the enactment of suitable laws providing for complete river regulation beginning at the head waters and including forest protection and reservoir construction.

WELFARE OF SETTLERS UNDER RECLAMATION PROJECTS

We believe the United States Reclamation Service has fully carried out the purpose of the Reclamation Act in so far as the construction of engineering works is concerned. Experience has, however, demonstrated the expediency of extending to the Service additional authority to the end that it may promote, at first hand, the welfare of the settler upon the land.

STREAM GAUGING AND TOPOGRAPHIC SERVICE

We urge upon the Federal governments the necessity for more liberal appropriations for the work of topographic survey in hydrographic stream gauging work; and we urge stronger co-operation by several states and provinces in making appropriations for this important work.

IRRIGATION SECURITIES

We urge that the states of the arid regions assume their proper moral and legal responsibility for the success of the Carey Act works, and states irrigation districts, and pass

such laws as will enable the completion of all meritorious projects now undertaken.

IMPROVING FARM CONDITIONS

We recommend that the Federal governments empower commissions to investigate and report and make recommendations in relation to the various colonization systems in vogue in other countries, and concerning rural settlement, as well as the methods of national or state co-operative farm banking, credit and marketing systems.

FUTURE WORK OF THE CONGRESS

The International Irrigation Congress has been in existence for the past twenty-three years. Its original purpose was to arouse public interest to the end of revising and reforming the irrigation legislation of the Western States, and of inducing the Federal Government to inaugurate a national policy of arid land reclamation. Largely through the efforts of this organization, practically all the Western States and Provinces have enacted irrigation laws based upon sound legal principles and designed to establish irrigation practices which would turn to the best account the land and water resources of the country. The Federal governments have fully committed themselves to the policy of arid land reclamation, and to the extent to which sound irrigation laws and practices have been established, and important irrigation works have been constructed, the original purpose of the organization has been fulfilled. Therefore, we recommend that this organization now pass on to the more serious consideration of those problems upon the solution of which depends the success of the investor in irrigation enterprises and the happiness and welfare of the settler upon the lands.

ACKNOWLEDGMENT

RESOLVED, that the sincere thanks and cordial appreciation of this Congress be made known to His Excellency, the Lieutenant-Governor of Alberta, G. H. V. Bulyea; to His Honour, the Premier of Alberta, Hon. A. L. Sifton; and to His Worship, Mayor Sinnott and the Aldermanic Council of Calgary, and the citizens of Calgary; to Mr. J. S. Dennis and his able corps of assistants in the Natural Resources Department of the Canadian Pacific Railway Company; to the Board of Control, individually and collectively; also to the Irrigation Congress Chorus, and to Mr. Max Weil, its able conductor; and to the public press.

We commend our distinguished President, Major Richard W. Young, for his leadership and ability and impartial conduct in the chair; and we commend our Secretary, Mr. Arthur Hooker, for his able services.

We extend the sincere thanks of this Congress to the Dominion Government of Canada, and to the Federal Government of the United States, for the earnest co-operation of their talented experts in the respective branches of the Departments of the Interior and of Agriculture; and also to the respective Provincial Governments of Alberta, British Columbia, and Saskatchewan.

We commend the splendid work of the Western Canada Irrigation Association in its past eight annual conventions, in promoting the development of irrigation in the western provinces of Canada, and in the betterment of farm life conditions; and we especially commend the Department of the Interior and its Irrigation Branch for the appropriations which have made possible the publication and distribution to the public of the printed proceedings of the various conventions held by this association.

Respectfully submitted,

(Signed) J. T. HINKLE, Chairman.

W. J. THOMPSON, Secretary.

MR. J. T. HINKLE, Chairman Resolutions Committee: I move the adoption of the report as read.

MR. KURT GRUNWALD, of Colorado: I second the motion.

PRESIDENT YOUNG: Mr. Hinkle of Oregon moves the adoption of the report as read. The motion is seconded by Mr. Grunwald of Colorado. Are there any remarks or any discussions on any of the resolutions?

MR. J. S. DENNIS, of Alberta: There is one resolution in the report which I think is deserving of some consideration at the hands of delegates, and that is the first, as follows:

“RESOLVED, That we favour the federation of the International Irrigation Congress and the International Dry-Farming Congress, and, to that end, direct the Board of Governors of this Congress, either as a body or by sub-committee, to work with a like committee from the International Dry-Farming Congress for the purpose of arranging and planning details for the amalgamation of the two Congresses; the Board of Governors to report its conclusions and recommendations to this Congress at its next session.”

I am of the opinion, Mr. Chairman, after giving this resolution some consideration, that it is a very desirable move. I frankly confess that, at first sight, I was a little bit doubtful of it. The Dry-Farming Congress has become an important body and is, I understand, practically in session at this time. It is a Congress devoted to the programme of farming under dry-farming methods. This Congress, the

parent one of the kind, for twenty-three years has devoted its methods to better farming under irrigation. Now the two methods of farming are somewhat diverse, and I frankly say that, at first sight, they were so diverse that I had a doubt in my own mind whether a joint Congress to discuss both subjects could be held, without bringing about a dispute between the advocates of dry-farming and those disposed to encourage irrigation farming.

After thinking it over, after all, it is all farming. It is all concerned with the better utilization of the soil and it is all concerned to encourage home-making through the proper utilization of soil, and, therefore, I have not any doubt now that if it is possible to consolidate the two Congresses so that this great broad question of agriculture, whether by dry-farming methods or irrigation methods, can be discussed, it will be along the right line. It has the further advantage that these two Congresses, dealing with practically the same foundation subjects through different aspects, are each gradually attracting a set of followers to their different methods, which is a mistake. This is owing to the organizations and to the fact that they do not meet together. My expectation would be, that, if a basis of consolidation could be arrived at, through consolidation of the Dry-Farming Congress and the Irrigation Congress, and a suitable name given, which would be one of the difficulties, we are going to have, we would have, I hope, a Congress meeting every year, either in the United States or in Canada, whose energies would be devoted to the full consideration of all the many questions concerned with better agricultural methods and better home-making, and we would accomplish a great work.

Both Congresses are important, and they both cost a lot of money. It costs easily from twenty to twenty-five thousand dollars, aye, more than that, thirty thousand dollars a year to hold a session of this Congress. By consolidating we will accomplish this much: if instead of spending fifty thousand dollars on the two Congresses we spend thirty-five thousand dollars on the one, we will be financially ahead. In the end, as always happens in the multitude of things and in the diversity of discussion, it will do no end of good. I have much pleasure, therefore, Mr. President, in seeing this in the report of the Resolutions Committee. (Applause.)

MR. F. C. FINKLE, of California: I had not intended to oppose this resolution, and I do not know that I wish to have my remarks so construed now, because it merely provides for the two bodies, or for the Board of Governors of this organization taking the matter up with the Dry Farming Congress. It takes two to make a bargain, and we have to hear from the Dry-Farming Congress, and hear also from this Congress when the matter again comes up. Therefore,

I cannot say that it will do any particular harm. Nevertheless, I might as well state that it is my opinion that this is a very unwise move. Mr. Dennis has only given one argument in favour of consolidation and that is the financial argument.

Everything else is no argument in favour of consolidation. In the first place, if you consolidate these two bodies, what are you going to call them? You cannot call them an Irrigation Congress any longer, because dry-farming is antagonistic to irrigation. You will have to call it something else, and I dare say if the two bodies ever were to consolidate that it would resolve the two bodies into a debating society on the subject of Dry-Farming vs. Irrigation, and Irrigation vs. Dry-Farming, which would, in my judgment, destroy their use and bring about as much harmony as exists in Europe to day between the Germans and the allies, minus the allies. It does not do any harm, however, to take this up, because we cannot marry the Dry-Farming Congress unless she is willing to be married, and she has still to be heard from.

I do not know how it is in Canada. I suspect from what I have heard that there is not so much diversity between dry-farming and irrigation as there is in the United States. There is certainly a big diversity south of the line, though, and I think if you were to have the Congress anywhere in the United States, I mean the Irrigation Congress, that this question would be voted down and a consolidation would not meet with favour. Unfortunately the proceedings held in Salt Lake City, at the Twentieth Irrigation Congress, have not been published. At that time the matter was thoroughly debated and it was voted down after a thorough debate and consideration, with but a few votes in its favour, and everyone went home believing that that Congress had taken the right action. However, I think the delegates might consider it favourably as a matter of negotiation, and as long as it takes that form I do not know that it would do any harm. Personally, I would vote against this resolution if given an opportunity to do so.

MR. C. E. LAURENCE, of British Columbia: What I would like to say, Mr. President, is that the only justification of what the last speaker has said is his utter ignorance of the subject. You will pardon me for speaking so plainly, but it is the lack of education on this particular subject which is at present causing the confusion. At the first convention of the Western Canada Irrigation Association, I was present at the tail end of it. Professor Campbell, the dry-farming advocate, had spoken and his speech had been discussed and I have always been sorry that I did not hear it, but I got it second-hand from a friend of mine, and I thought there was

so much in it that I studied up the question, and for the last seven years I have been studying it, and for the last six years I have been practising it in connection with irrigation. There is no antagonism at all between dry-farming methods and irrigation practices. I go further than that and I put it in these words, that the knowledge and practice of dry-farming methods in connection with a proper use of irrigation water is the true science of agriculture. (Applause.)

I am glad to hear that that meets with the approval of the gentlemen here who are probably irrigationists, because that sentence has been indorsed by some of the highest agricultural authorities in British Columbia. In the interior of British Columbia we have the same conditions that you had in the western semi-arid states. In the particular district that I come from, Kamloops, we are in the centre of the Dry-Belt, and we are also in the centre of the great irrigation district of the interior. There are two climates in British Columbia. The coast climate has an annual rain-fall of over sixty inches and the consequence is that they know nothing at all about irrigation. In the interior we have seven to twelve, and perhaps fourteen inches of rain-fall and we have, of course, to irrigate.

We thought we had to, but there is always the wrong side of the ditch. If I have ever so much water on my land, there is some land on the other side of the ditch that cannot be irrigated, and that must either lie in its present state or it must be farmed under dry-farming methods. I have water on my place, but there are some of my neighbours who have no water and no means of getting it there. Then I went back to Kamloops and began to talk about dry-farming methods and studying the question. They said all sorts of complimentary things to me—"faddist" was a very mild word—but I stuck to my guns. Many men, who then scoffed in good humour at me, are now practising dry-farming with a rain-fall of less than twelve inches, with wonderful success. Now, I do not know very much about these things, but I will tell all I know to any one who wants the information. It has got now so that I am called a crank on dry-farming. Any one who practises dry-farming in its entirety can get an average crop where he might get nothing otherwise. Therefore, I hold that the necessity of a knowledge of this subject is such that every step that can be taken should be taken to obtain that information. I may say that if Mr. Dennis had not proposed this matter it was my intention to have done so, but I am glad that Mr. Dennis did, because he has done so very much better than I could possibly have done, but my earnest support is in favour of the amalgamation of these two Congresses as proposed.

DR. F. S. HARRIS, of Utah: I am heartily in favour of the resolution, and with regard to the objections of my friend from California, I believe those objections are without force. In the first place the question of a name has not any comparison with the great good that these organizations do. A rose by any other name will smell as sweet. I think that the only real antagonism is in the minds of a few men. It is my good fortune to give courses each year in irrigation and also in dry-farming, and I must confess that at first I thought there would be an antagonism between the two. As I have studied the subject, I find that I am brought back to the same end all the time, and that is the question of the conservation of water, and that is the main reason for irrigation, and the main reason for dry-farming—the conservation of the limited supply of water that exists in the arid regions. All this irrigation is simply a question of the conservation of the rain-fall in reservoirs to bring it on to the land. All that dry-farming is is to store the water in the soil itself.

No man is a good irrigator unless he conserves the natural precipitation of water. If he has twelve inches of rain-fall, that should be stored in the soil and simply supplemented by a certain amount of irrigation water. It is absolute folly to try to irrigate without the natural precipitation, so the two Congresses should go hand in hand, there being no conflict between the two. In regard to sentiment, I believe they are quite with us. I have talked with many leading people in the West about this question, and I have yet to find a single person who is not in favour of the union of these forces. As Mr. Dennis says, the thing does not appeal to you at first. I happen to be a member of each, and I have attended the sessions of each for a number of years, and I find that the discussions run along the same lines. After all, Mr. Dennis hit the nail on the head when he said it was a question of farming. That is all we are talking about. We do not care anything about these great irrigation works unless they help out farming. We do not care anything about a beautiful dam for the sake of its ornamental qualities—it is a question of its use for farming. The whole thing is a question of the improvement of arid regions, and I feel that economy in holding the sessions is only one of the reasons why these forces should be joined. I think that a great importance would be given to the movement of farming in arid regions if these two great international movements were joined. (Applause.)

MR. JAMES JOHNSTON, of British Columbia: Mr. Chairman: I wish to add my voice in favour of the resolution because I attend both the Dry-Farming and the Irrigation Congresses, and at the present moment I cannot attend the other because I am here. I come to this Conven-

tion to get the best information I can get, and I practise dry-farming on one part of my ranch and irrigation on the other, and I find that by doing so I get the best results on the whole, therefore I wish to add my voice in favour of the resolution.

MR. G. N. HOUSTON, of Alberta: Mr. Chairman: I have had an opportunity of becoming more or less acquainted with a great many of the irrigation projects in the United States, and it is my opinion that the only hope of a great many of the irrigation projects, which are now tottering on account of the small quantity of water which they have, is an intelligent practice of dry-farming methods. I therefore wish to endorse this resolution.

MR. E. F. BENSON, of Washington: As I understand it, this Irrigation Congress was started to develop public sentiment in the United States. Since that time the fundamental reason for this institution ceased, and it then became an institution to demonstrate the widest and best information, and administer it to the country in general. I have been a member of the Dry-Farming Congress for three or four years, and I have always heard the same argument presented there as here. My contention is this, if you do not consolidate you will go down, both of you, because they dig up \$30,000 every year as the Calgary people have done this year. There are plenty of things that the combined institutions can do, but if they stand separately and tax the country \$30,000 each year from two sources, some one is going to get tired and fall out.

PRESIDENT YOUNG: Is there any further discussion regarding the report of the Resolution Committee?

Upon putting the motion to vote, the report was adopted unanimously.

PRESIDENT YOUNG: The resolution appears to be unanimously adopted.

MR. J. S. DENNIS: Mr. President, have I your permission to make an announcement?

PRESIDENT YOUNG: Certainly.

MR. DENNIS: In the interval I want to explain to the delegates that, for the purpose of enabling the delegates from south of the line who want to return via Lethbridge to-morrow evening to do so, we have changed the hour at which the special will leave to-morrow morning to 9 o'clock instead of 10 o'clock. That will give us sufficient time to get all the delegates back in time to make connection with the train for the south at 6.45 o'clock. Will you kindly make that information as widely known as possible? The

train will leave at 9 o'clock instead of 10 o'clock, returning about 6.30 p. m at the latest, so that the delegates who desire to make the train for Lethbridge at 6.45 p. m. will be here in time.

PRESIDENT YOUNG: The Secretary will read a resolution, submitted as a separate resolution, which was not prepared in time for submission under the rules. It is a resolution which has been submitted by Professor Ball, Dr. Harris, Mr. Nares, of California, and by myself.

The resolution was read by the Secretary as follows:

RESOLUTION

The delegates to this Convention from the United States desire to express their gratification that the Congress of the United States, acting in accordance with resolutions of this body at the Salt Lake meeting in 1912, has extended the terms of payment for reclamation works from ten years to twenty years. In this act of August 13, 1914, making such extension, it is now seen that the Congress of the United States has gone too far in permitting such extension to all land owners, whether or not cultivating or improving the reclaimed area. As a result, speculation in such reclaimed land is encouraged and the real irrigator discouraged by the fact that vast areas of surrounding lands are held out of use serving as breeding grounds for pests. We, therefore, urge that prompt action be taken by Congress to limit or restrict this privilege of extension of payments to the lands which are actually under effective cultivation, and to require interest on deferred dues on all lands not thus cultivated.

We also urge the repeal of Section 16 of the said Act of August 13, 1914, which transfers the control of the expenditure of this reclamation fund from the Secretary of the Interior, and his experienced advisors, to a committee of Congress, the members of which do not and cannot learn that knowledge and deep interest in western conditions so essential to success. It is evident that this act practically nullifies the main objects of the original Reclamation Act in creating a revolving fund and in permitting indefinite extension of meritorious projects leading to home-making in the arid West.

(Signed) RICHARD W. YOUNG
E. D. BALL
F. S. HARRIS
L. A. NARES

MR. J. A. HAPPER, of Texas: Mr. Chairman: I desire to second that resolution.

MR. E. F. BENSON, of Washington: Mr. Chairman, I would like to ask a question. My recollection is that that Act only applies to those who improve their land to the extent of half the land put under cultivation at the end of five years. I am wondering if the gentlemen who drew the resolution had a copy of the Act before them or had all of the provisions in mind. While I am on my feet I wish to say that I most heartily concur with the last speaker, changing the Act to make it more reasonable.

PRESIDENT YOUNG: I cannot definitely answer that question myself. It is possible that some one else can. The resolution was drawn with the understanding that the extension was to all land owners, but it is an extension at least for a period of five years, and to that extent, in the judgment of those who submit the resolution, the Act has gone too far.

MR. BENSON: I think the Act should require the cultivation of all the tillable land in five years, and from twenty to twenty-five per cent each year. If that was incorporated it would make the thing very reasonable.

PRESIDENT YOUNG: Gentlemen, the motion is to adopt the resolution as read. Are there any further remarks? (No response.)

The motion was put to a vote and carried.

PRESIDENT YOUNG: The resolution is adopted.

Our next order of business is the report of the Committee on Permanent Organization, of which Mr. Newman is Chairman, and Mr. Grunwald is Secretary.

MEMBERS OF THE

PERMANENT ORGANIZATION COMMITTEE

L. NEWMAN, Chairman.....	Montana
F. H. PETERS.....	Alberta
WM. YOUNG.....	British Columbia
L. A. NARES.....	California
KURT GRUNWALD, Secretary.....	Colorado
J. B. CASE.....	Kansas
W. T. BYRD.....	Louisiana
C. W. CARMAN.....	Michigan
H. N. SAVAGE.....	Montana
C. E. FLATT.....	Saskatchewan
C. A. KINNE.....	Texas
GEO. A. SMITH.....	Utah
E. F. BENSON.....	Washington

PRESIDENT YOUNG: The report will be read by the Secretary, Mr. Grunwald.

Report of the
Committee on Permanent Organization

Calgary, Alberta, Canada,
October 8th, 1914.

To the Officers and Members of the Twenty-First International Irrigation Congress:

We, your Committee on Permanent Organization, beg leave to report as follows:

The Committee has unanimously nominated the following officers of the International Irrigation Congress for the year 1915:—

MR. J. B. CASE.....	President
Abilene, Kansas, U. S. A.	
MR. ARTHUR HOOKER.....	Secretary
Spokane, Washington, U. S. A.	
MR. J. S. DENNIS.....	First Vice President
Calgary, Alberta, Canada.	
MR. RICHARD F. BURGESS.....	Second Vice President
El Paso, Texas, U. S. A.	
MR. J. T. HINKLE.....	Third Vice President
Hermiston, Oregon, U. S. A.	
MR. KURT GRUNWALD.....	Fourth Vice President
Denver, Colorado, U. S. A.	
MR. GEORGE ALBERT SMITH.....	Fifth Vice President
Salt Lake City, Utah, U. S. A.	

The following named places made applications for the meeting of the next Congress:—

Galveston, Texas.

Oakland, California.

Upon discussion a resolution was unanimously adopted requesting the Board of Governors to negotiate and contract with such city as will, in the judgment of the Board, best serve the interest of the Congress.

The Committee unanimously endorsed the Newlands Bill and urged the Resolutions Committee to recommend its adoption by the Congress.

Respectfully submitted,

(Signed) L. NEWMAN, Chairman.
KURT GRUNWALD, Secretary

MR. GRUNWALD: Mr. Chairman, I move the adoption of the report.

DR. E. D. BALL, of Utah: I have much pleasure in seconding that motion Mr. President.

The motion was put to a vote and carried.

PRESIDENT YOUNG: The report is adopted unanimously. I would like to say that it will be my pleasure at to-night's session to introduce the President-elect of the Congress.

There is another invitation for the next session of this Congress, which is conveyed in the following telegram:

INVITATION FROM BATON ROUGE

Baton Rouge, Louisiana, October 7th, 1914.

W. T. Byrd, Care Irrigation Congress, Calgary, Alberta:

The Chamber of Commerce requests that you, as its second vice-president, invite and urge the Irrigation Congress to hold its next convention at Baton Rouge, on the foothills of the hemisphere, and in whose harbour foreign shipping meets the drainage of the Mississippi Valley.

(Signed) JOSEPH RAMIRES, President,

By Order Executive Committee.

(Applause.)

PRESIDENT YOUNG: The adoption of the report does away with the next item of business, the selection of the next place of meeting.

We now reach the Call of the states and provinces, under which five-minute talks will be heard from the provincial and state representatives. We propose, ladies and gentlemen, to adopt a rule which has not been heretofore adopted, and to ring the bell as we have generally done in previous sessions of the Congress. The first bell will be rung after the speaker has spoken for four minutes, to give him one minute in which to make his peroration, and then in five minutes the final bell will be rung twice, and that will of course end the talk. The Secretary will call the roll of the provinces and states represented in this Congress.

ALBERTA

MR. J. S. DENNIS: Mr. Chairman, we cannot allow Alberta to let five minutes go begging when we have an opportunity such as this. I had hoped that some one else who had not taken up so much time of the Congress would have said a few words. Some men can say quite a lot in

five minutes, but I do not know that I can—the subject is such a gigantic one. Alberta is only a small portion of our Great West, but those of us who are proud to live in Alberta are always ready to say a good word for it and sometimes possibly out of season. We speak of it as “Sunny Alberta” and we advertise it as “Sunny Alberta.” We have endeavoured by a special arrangement with the Clerk of the Weather, after exerting a very great deal of persuasion, to show you that sometimes the sun does shine in Alberta.

The province, extending as it does from the international boundary practically up to the Far North, contains within its boundary a country of all characters of climates and soils. However, we are optimistic enough to think that anywhere within its boundaries a man of the right kind can make a home, and our object is to get men together and make those homes. We want them badly. We think we have a great province in the Great West, and we think that its future is bright. Its potentialities are great—soil, climate, fuel, natural gas, oil (we hope), but over and above all, what we feel is foundationally the greatest of all assets, a suitable soil for home-making—these are among a few of our attractions.

We have not had the progress that we hoped for. We have had a marvellous progress in the development of our urban centres and our railway centres, and our coal mining industry and the natural gas of the province, but we have not had the extension that we hoped for and that we need in our agriculture. That is our problem of the future. It is a big problem. It is the same big problem that is concerning all the large portion of Western America. People on the land and not in the urban centres. In Alberta we are going to try to correct that, realizing that in our urban centres we have got to have a period of marking time until we can get the agricultural centres up to time.

Speaking for Alberta, modestly, I hope, but optimistically, I also hope, we look forward to the time that Alberta will have the good luck to persuade the larger number of our delegates and their friends who have been so good as to come up here, that they will come back the next time with the intention of throwing in their lots with us and to make Alberta what she should be. (Applause.)

BRITISH COLUMBIA

MR. W. E. SCOTT: Mr. Dennis has found it a very difficult matter in the space of five minutes to describe the great attractions of the province of Alberta. How much more difficult, then will it be for me in five minutes to describe the glories of our province of British Columbia. Mr. Presi-

dent, ladies and gentlemen, you heard what I said at the beginning, but it is a very difficult matter in the space of five minutes to give you any adequate idea at all as to the resources and attractions of our great province to the west of us here. Before I say anything about it I would just like, on behalf of the representatives from British Columbia and for myself, to thank the good people of Calgary for the very hospitable reception they have given us, and for the splendid time which they have given us. I assure you that all the delegates from British Columbia very much appreciate that indeed, and also, in a few words, I would like to express my appreciation for the splendid work of your Board of Control, for the way in which they have managed this Congress, which is one of the best Congresses I ever had the pleasure of attending.

Also may I refer to your exhibits. I had the honour of being one of your judges in judging your exhibits. I think that it is a very good thing to have these exhibits at these Congresses. They have a great educational value. Just to illustrate how close they were in the first three exhibits when we handed in our individual scores the only difference in the first three was three quarters of one per cent, which was such a near thing that we left it to another judge to give a decision. In those first three exhibits there was nothing to choose between them, as the decision of the judges showed.

British Columbia is a big province, as we all know. It has an area of 252,000,000 acres. It has a population of 450,000. Yet the returns from that province last year in agriculture, in minerals, in fisheries, in timber and in manufactures was no less a sum than \$144,000,000, which gives a per capita production of well over \$300 for every man, woman, and child within the province. (Applause.) We are going through the evolution of a new country, although the appellation of B. C. might lead one to think otherwise. Still we are a new country, and we have many problems to contend with. We are going through the evolution that you people to the south of us went through years ago, but we will come out on top all right. There is one item which has undoubtedly militated against settlement in our country, and that is the real estate element, which has been in evidence in the last few years in the West.

That has come to an end now, and it is a good thing it has, because it will give us an opportunity to travel the lines of legitimate development. What we have to consider now is how to get people on the land, how can they make their living off the land. If you will look at the exhibit of the Canadian Pacific Railway Company and the British Columbia Government, you can realize that we can grow the produce

all right. The marketing of that, however, is the difficulty now, and as long as the farmers keep on their individual marketing, and will not come together on sane business-like co-operative lines, they will never get the prices for their produce to which they are justly entitled.

Turn again to our province. I just want to illustrate what has been accomplished in eighteen years in one district. Eighteen years ago the same famous Okanagan Valley, I would be safe in saying, did not ship out fifty carloads of produce. I think a conservative estimate of the amount of produce this year is 2,700 carloads of fruit and vegetables. (Applause.) So you will see that we are making some progress.

We have also the beautiful country on Vancouver Island, and our fertile plains of the delta, and the east and west Kootenay, and the Thompson Valley, and all those great countries—countries which will come into their own. The irrigation problem is one which we have, as well as you people, and one which we are endeavouring to solve along good and proper lines. I was very pleased to see that this Convention agreed to that resolution—(Time expired).

MR. KURT GRUNWALD, of Colorado: Colorado relinquishes its five minutes to British Columbia. (Applause.)

PRESIDENT YOUNG: Your time is extended five minutes under the circumstances.

MR. SCOTT: Mr. President, Ladies and Gentlemen, I really must extend to the representative of Colorado my great appreciation of his kindness. I think it is extremely nice.

MR. DENNIS: They realize that Colorado does not need any boost, Mr. Scott.

MR. SCOTT: We want to get people on the land, and how can we best get them on the land? There is one point which I want to mention, and I do not think too much emphasis can be laid on it, and that is, that we want to get away from this advertising and making statements which may be true, but which are misleading, in as much as they do not represent average conditions. Even if legislation had to be brought into effect to control that, it would be a good thing, because a man comes out here and he is told that he can do certain things, and make two or three hundred dollars an acre off the land, and he comes out and works hard, and does his best, and he finds that these stories are fairy tales. A discontented settler is the worst advertisement a country can have.

Then, how can we help the people on the land? I maintain that the best way is a policy of education beginning through our universities and our agricultural schools, the same as we have in the province of Alberta, and let me take

this opportunity of saying—I think your agricultural school system in Alberta is just about ideal. By our agricultural schools and demonstration farms and plots, if you can show the farmer how he can increase that twenty bushel crop of wheat to one of forty alongside of his land, with only a small extra expenditure, you have a convert, but you have to show him the method, and I think that is a line of work that we can well take up in our country. As far as our department is concerned, we are already teaching that class of work, but it should be taken up by scientific methods, showing a farmer how he can increase a twenty or thirty bushel crop to one of forty.

I have always been told that I am a crank on one subject, and that is on the question of co-operation, and co-operation is in the air in our province, I am glad to say, and is coming to stay. The farmers have got to get together. Does it not seem somewhat of an anomaly, when you come to think of it, that farming is the only business in which the price is dictated to the farmer himself? A man says twenty-five cents a dozen is the price of your eggs. The manufacturer says this is the price of my goods. Now the only way that can be changed is by effective co-operation along well thought out and business-like lines.

I have one thing to say which I had nearly forgotten, and that is, when the next Congress is held in Canada, British Columbia is going to make a great bid for the Congress. (Applause.) And I want all you sister provinces here to vote for British Columbia for this reason, that we have totally different conditions in British Columbia. They are not similar to what you have here, and we will do our best if it comes to British Columbia. We cannot excel, but we may possibly, if we try hard, equal the very great hospitality that we have had from the citizens of Calgary. (Applause.)

CALIFORNIA

MR. L. A. NARES: Mr. President, Ladies and Gentlemen: California did need, at one time, a great deal of boosting. I do not say that it does not need boosting still. Alberta was first called on, and when I saw some hesitation, and then my old friend, Mr. Dennis get up, it reminded me of the story of the Californian who was travelling east and he got into a town where he found pretty nearly all of its citizens were attending a funeral. He followed that funeral into the church, and at one time during the sermon the priest invited anybody to say anything that he had to say with regard to the departed friend. There was a hesitation perhaps for several minutes, and then our friend from California got up and said, "I did not know the deceased, but I

think he must have been a pretty good man to have had so good a funeral, but," he said, "as there is not very much else I can say for him, I want to say that I come from California, and I want to tell you what a beautiful country California is—it is the land of sunshine, fruit and flowers."

He got his boost in for California. I think that Alberta is always getting a boost in. I have heard of it in a great many parts of the United States and I think, gentlemen, that it deserves it. We from California appreciate very much the hospitality that has been shown to us, and we appreciate how Sunny Alberta has taken hold of such a large delegation as this, and has given us such a fine exhibit, and such a good time, and we thank them for it. We hope next year that California,—also Sunny—also a country of fruit and flowers, and some wheat, and some oil, some lumber, something of almost every produce that is raised on the globe, that we, next year, will have the pleasure of returning that hospitality. We are putting in a very strong bid for the next Congress. We feel sure that we are going to get it. California has, at its own expense, financed a Panama-Pacific International Exposition. We know that all the people of America and Canada, or the great, great majority, are going to be anxious to come to California. They say there are only two different classes about California: those people that have been there are in one class, and the rest that want to get there are in the other.

Now to be really serious about California is very difficult. I have known this western country for a long time, and I have travelled through a great part of the United States. California is now my adopted home, but I am not going to try and say that California is first. There are so many good things to be found, and good lessons to be learned, from everything that one sees; and especially we should all be gratified that we are able to learn so many good lessons at Congresses like this, attended as they are by men who have studied the problems of irrigation for a great number of years, and I hope that I shall have the pleasure of attending many other Congresses, and getting as many and as good results. I thank you Mr. President and gentlemen.

COLORADO

PRESIDENT YOUNG: Colorado has already spoken in the person of Mr. Scott.

IDAHO

PRESIDENT YOUNG: I have pleasure in introducing Mr. G. E. Harlan, of Twin Falls, who will speak for the Gem state.

MR. HARLAN: There are but a few of us from Idaho here, on account of its being almost inaccessible for some reason or other, but I think we would have passed up some of our time to our sister provinces if it had not been for a remark that I heard from a lady of Canada who used to be a resident of Chicago. I told her I was from Idaho, and she said she did not know we had anything at all in Idaho. Now I can assure you that we have. We have a beautiful country, and a beautiful climate, and we have been very graciously cared for by the Reclamation Service, as well as by the Carey Act project. Personally, I am very proud to be from southern Idaho, and especially from the Twin Falls South Side Tract, and I believe there is not a man here from the States who has not heard something of it.

We have some twenty or thirty Carey Act projects in the state of Idaho. Most of them are successful. We have had some few failures, some that need considerable bolstering to make them successful at all. Speaking of the extreme southern Idaho, I have this to say. We are located on the south side of the Snake river, and our project was built and financed by eastern capitalists. We have there a project of approximately 200,000 acres, upon which water was turned March 1, 1905, and this present irrigation season we have delivered water to 160,000 acres of that land.

Idaho has diversity of climate as well as production. We are a long state, from the Canadian border on down to the Nevada line. The northern part of our state is immensely wealthy in its mineral production, also its timber. Further south we begin our irrigated countries around Boise following down the Snake river to the extreme eastern portion, where we have our great irrigated district near Wyoming. Irrigation in the eastern part of Idaho has been going on for several years, but in southern Idaho nothing was done till 1905. Our big reclamation project, directly east of us, is known as the Minnendoka project. In southern Idaho we raise everything except perhaps bananas and oranges. We have never tried those, perhaps we can.

We want to draw your attention to the great production of seeds in southern Idaho. We are going in for that, especially alsike and red clover. We have about 5,500 acres of alsike clover and about 44,000 acres of alfalfa. Now this alsike clover, as well as the red clover, we find to be very great in its production, as well as in its price. We raise from five to thirteen bushels of red clover and alsike seed the acre down there. The average is seven and a half. Now it has been emphasized here that we should not make statements which we cannot back up, but seven and a half bushels is our actual average upon this seed. I thank you gentlemen. (Applause.)

KANSAS

MR. J. B. CASE: Mr. President, I do not like to make the other people of the United States feel bad, but I do feel that I ought to say a word for Kansas. Two-thirds of the state of Kansas is in what is known as the rain belt. One-third of its territory is subject to irrigation, and we have now a commission and are experimenting on the pumping proposition, and I have every reason to believe that it is going to be a success, and the western one-third of our state, when it is demonstrated that it is a success, will produce more than the eastern part of the state.

As a small boy I went to Kansas forty-three years ago. Then Kansas was in its wild state. Indian and the buffalo were then very prominent, but after we became a state, after the bloody battle of the Lawrence Massacre we began to grow. We have had all kinds of troubles, we have had droughts, grass-hoppers and trials and vicissitudes, such as you may go through now in this great Dominion, but through it all we have stuck to it, and stayed with it, until to-day we have passed all competition in raising grain.

I do not care to take up your time, but I have a letter from Mr. Mohler, the Secretary of Agriculture for Kansas, which gives you a little idea of what Kansas has produced in the year 1914. Our reports show that Kansas harvested 8,790,000 acres of wheat, and if this figure is taken with the government estimate of the yield at twenty bushels per acre, it would mean we have had and raised 180,197,000 bushels of wheat. The estimate of corn by the state of Kansas is 125,000,000 bushels; oats 55,000,000 bushels; Irish potatoes 4,000,000. bushels

The acreage of alfalfa this year is reported by assessors to be 1,190,340 acres, larger than any other state in the United States. Kansas is fourth in production of butter, fourth in eggs, and in other products I believe that we will run about that way, and I feel that with modern science, with our agricultural colleges, with our education along the lines of science and new ideas, that we will increase our production of wheat and corn and other products at least in the next five or ten years by one-third. Gentlemen, I thank you. (Applause.)

LOUISIANA

MR. W. T. BYRD: Mr. President, Ladies and Gentlemen: Based on the old adage that an honest confession is good for the soul, I wish to make first an honest admission to the effect that my prime object in attending this Congress was to acquire knowledge and absorb ideas from the talks of the distinguished gentlemen that have and will address

us on these very interesting subjects; not that I would not gladly give you free access to any knowledge that I had that might be beneficial to you collectively or individually, but I did not feel that I knew anything that would be of benefit. However, having been requested by our worthy Secretary to say a few words this evening, I wish to address you on what I think are the two most important subjects of this day, namely organization and utility.

First, if we ever expect to accomplish any big thing as communities or nations we must unite. United we stand and divided we fall. One instance I would cite: How long do you suppose it would have taken for an individual to have raised enough capital to build the Canadian Pacific Railway, or how much do you suppose gasoline or oil would be costing Americans had it not been for the organized efforts of the Standard Oil Company?

We are retailing good kerosene in Baton Rouge, Louisiana, for seven and a half cents per gallon. What do you suppose it would be costing if it were not for the wonderful economic policy that the Standard Oil Company is able to adopt in its manufacture? Consider the fact that they are able to keep installed the very latest machinery, etc., and to lay a pipe line from Oklahoma to Baton Rouge, Louisiana, and thereby pipe the crude oil from Oklahoma to Baton Rouge, and that by gravity, actually saving the expense of a single pump. At this place they confine it and syphon it into tank steamers, that are able to come to our port, and ship it to all parts of the world.

What would our bread be costing us were it not for organized capital in the shape of up to date flour mills? Corporations must be held in line when it is necessary by the enactments of our legislatures. Yes, so do individuals—and as a tribute to the Canadian Pacific Railway Company, as well as answering the Canadian Pacific Railway Company knocker, I would ask this question. Had it not been for them, do you think I could have eaten supper in Baton Rouge last Wednesday evening and breakfast here Monday morning, with a day and night in Chicago, and would I have found Calgary such as it is to-day, when I did arrive?

As to utility, gentlemen, I believe that God, in his wisdom, has put everything on this globe, and on this side of it too, that the almost unquenching desire of man can wish for, or at least need. But the wheat does not ripen into hot rolls, or the sheep fleeces grow into ready made suits of the latest style. Nor does it rain just exactly everywhere we want it, and just when we want it. There is an abundance of water in the United States and Canada at all times for all needs, if it were properly utilized and distributed; thus

the untiring efforts of these great men here and the ones that have preceded them.

Now in my section there is scarcely a time that we have not too much water, while some of our sister states and our beloved cousin states on this side of the border are parching and suffering for the need of it.

Between all of us we ought to be able to devise ways and means to divert it, from the points where there is an excess, to the points where there is none or not enough. I think that Mr. Newland's great mind has at least thrown a ray of light into the arena in which all of our troubles were stored. What we of the southern Mississippi Valley want is to get rid of an over-abundance of water at any one time. May God bless the Irrigation Congress, and may its efforts be crowned with success to the benefit of both the man without any water and to the one with too much.

In conclusion, I beg to invite you to hold your next session in my home town, where we can show you what the man is up against with too much water. Besides this, I promise you the best time that it is in our power to show you. I thank you. (Applause.)

PRESIDENT YOUNG: There is a very small portion of the earth represented here which we overlooked to call upon, the Continent of Australia. (Applause.)

AUSTRALIA

MR. NIEL NIELSEN: Mr. Chairman, Ladies and Gentlemen: I had the privilege yesterday afternoon of addressing a few words to this Congress and I had no idea that I would get another privilege this afternoon of saying a few more. I am always ready and willing to say a word or two with reference to my own country, because I believe that Australia is the best country on God's earth, and I also believe, ladies and gentlemen, that it is occupied by about the best people. And, while I say that about my own country, I do not mind each one of you thinking the same of yours.

My experience, since I have been to the United States and to Canada, proves to me that the people of these countries in North America are the best boosters I ever had anything to do with. Every man in the United States thinks his home state is the best in the Union, and the United States the best place on earth, and I say that that spirit of patriotism which exists among the people of the United States could well be copied by many other countries in the world. Exactly the same thing applies to Canada. Everyone thinks his province is the best in the whole Dominion, and that the Dominion as a whole takes first place. That is how I feel

about my country, and that is why I am glad to have this opportunity of saying a little to you.

Yesterday I dealt with irrigation problems and pastoral and dairying problems. To-day I want to say a word in regard to our social conditions. The people of Australia are the wealthiest people on the face of the earth. The total amount of wealth of the people of Australia runs to \$500 for every man, woman, and child in Australia, and no other country in the world can show that. Notwithstanding that fact, some of our people grow old, and some of our people are poor when they get old, and for these people are provided a pension after they are sixty-five. It is no disgrace to be old, because one can go to the government and draw his few shillings a week, for the purpose of keeping him better than his circumstances have allowed him to provide for himself.

Let me tell you another thing. All invalids within the four corners of the great country of Australia are provided for by the State. Every invalid, who is a permanent invalid for life, instead of having to depend on his relatives, goes to the State month by month and draws his pension because he cannot help himself. (Applause.) Let me tell you something more, we believe that the best immigrant that can come to our country is not so much the man who walks into our port, as the one who arrives there by natural conditions.

We believe that the best immigrant in Australia is the Australian baby, and so we take more care of the babies in Australia than they are taken care of anywhere else in the world. We provide the mother, however poor, with the means to put her through that time in an up-to-date and sanitary way. We pay all the mothers a bonus of \$25.00 a head for babies born in Australia, so that as few as possible of these babies will be prevented from living, and that they will become good citizens of our good country. In saying these things I am only just wishing to tell you one or two things of how we manage our social life. We have the commodities that are necessary to keep body and soul together for next to nothing. I can buy a hind quarter of lamb in our country—(Time expired).

MR. E. F. BENSON, of Washington: Washington gladly surrenders her five minutes to her neighbour in the southwest, Australia.

MR. NIELSEN: I am very thankful to Washington. Washington State is one of the nearest neighbours we have on God's earth occupied by white people. The people of America are our nearest white neighbours, although they do not appreciate us as much as we appreciate them. I do

thoroughly appreciate the opportunity that the delegate from Washington has given me to-day to say a few more words. That is good enough for an Australian.

MR. L. NEWMAN, of Montana: Montana will yield half its time to the gentleman from Australia.

MR. NIELSEN: I was dealing, ladies and gentlemen, with the way we live there, and I was telling you that you can buy a hind quarter of mutton, in any of the retails in the city of Sydney, for about fifty cents for the hind quarter, containing fifteen to twenty pounds. Now bread is cheap there too, and the reason for that is that we have such a tremendous amount to pay to get stock to London, that we sell it cheaply to our own people, to get them to eat it. I can buy a thirty-two ounce loaf in any of the towns of Australia for five cents. We grow sugar by white labour—that is not done in any other part of the world. A few years ago we had Kanakas working in that industry and we passed what we call the White-Australia Law. We shipped these Kanakas back to the Islands. We decided that having taken away the cheap labour we would give the sugar planter protection. In addition to that we gave him a bonus for all the sugar he grew by white labour, and after ten years experimenting of that description we find that we can grow sugar by white labour and sell to the people at some five to six cents a pound, which is as good as you get here.

That is a proof that you can produce by white labour, with the assistance of machinery, just as cheaply as you can in other countries with black labour. We believe that Australia is a white man's country, and to keep it that we must work the tropical parts with white labour as well as the other parts. To do that we have had to provide means to allow our planters there to produce things which in other countries are produced by black labour. We believe in giving them the extra bonus necessary to allow them to do what we have proved can be done: that any industry can live without the adoption of cheap labour, because any industry which cannot do so has no right to live at all. (Applause.) We prefer to allow other countries to make those commodities which it is necessary to have cheap labour to make. We believe that everything should be done to make the condition of the poorer section of our people better than it was before we started the systematic progression of government that we have at the present time. We believe that the man who does the hard work in the world is the greatest asset the world has. If you do anything to make your workingman's load lighter, and his work easier, you will assist more in the general prosperity of the country than if you do something to boost a big trust or a big organization.

We have no trusts in Australia, ladies and gentlemen, We have no trusts in Australia, because you have them in America—that is the reason. We profited by your experience, and we decided to carry out our stock legislation before the trusts came, so as to prevent them coming and robbing the people of our country. Now, that might be considered strong language, and so it is—but when you take the varnish off, those are the facts and that is the position. As soon as any business becomes centred in the hands of so few people so that those few people have the right to dictate to the producer or the consumer as to what shall be the price of their commodities, so soon should that business be owned by the people themselves and owned by the State. (Applause.) Those are the reasons, gentlemen, why we have adopted practical socialism in Australia. I am not a socialist, as you understand it, at all, but I believe that if we go to the extent of that principle of saying as soon as any organization has power to put a price on the commodity of any particular individual, and says "We won't give you beyond that price," so soon should that power be taken away and adopted by the general communities of the State, and no injury will be inflicted on the individual. The interests of the individual is the concern of all. That is an old political gag, and in most countries that is all it is.

In our country, though, the people rule, and the people demand that the people should be treated in a proper way, not only by their legislatures and administrators, but also by the laws of the land. We are a law abiding people there, despite that fact, but we take care that the laws are what we want. In Australia we have given every man and every woman throughout the continent the right to vote, (Applause) and we ask those people, "what have you got to vote for?" and they tell us at once "to see that those in authority do not do anything against the common people," and this is the effect of it. Many of the things that we have taken up and carried out by the State, we have done so, because we have been compelled to. I may allude to one instance. Ten or twelve years ago we had an outbreak of the bubonic plague. That is a disease which is caused by infection from rats. We had lots of rats there, and everyone was in great distress as to how to get rid of them. I was a member of parliament in those days there, and I occupied a seat in parliament for fifteen years in Australia, and only resigned when I came to America. We decided one night in a hurry that people who had rats would have to kill them. They would not do that, they said, "Why should we disturb our rats? We have a right to let rats run on our property.?"

Well, what happened? Our Prime Minister took a surveyor down the main street and put in two pegs, and said,

"From there to the river is our property." That is what happened. Now, we assumed possession of all that part of the city of Sydney that abutted on Sydney Harbour. We pulled down the old buildings and built them up anew. We paid the people for the property we took from them, we did not take it for nothing either. We believed in the idea that what man owns is his. We have paid for that property and improved it, and the State has occupied it for ten years. We have built new walls and docks, and to-day that property pays more than five per cent interest on the total cost that was spent on it. We were forced into that because the people would not kill their rats, but that is an idea, of how, in a new country you can do things of that description, because you cannot get the individual to do what the State can do.

I am very thankful to you, ladies and gentlemen, for having listened to me to-day, and I am glad to be here, the only representative at this great Congress, to represent, not a province, or a state, but a whole continent. I represent the continent of Australia, and let me tell you ladies and gentlemen it is some country too. Australia is bigger than the United States of America. Although it does not contain nearly as many people, it is nevertheless bigger. We have five million people in that great country. We hope to make it as good a country as yours is, not only in area but in population. We look with pride to our cousins across the sea. We hope to progress with them, and we hope that the two of us, in the future, will be able to prevent such disasters as are at present taking place in Europe, once we are federated under a proper and systematic constitution. (Applause.)

PRESIDENT YOUNG: When you get a continent started it seems rather difficult to stop it. I am sure we were very much interested in the address of Mr Nielsen, particularly about the aid rendered to the old and the sick and to the mother. I venture this supposition, that the aid given to the mother does not include the twilight method which we have been reading about, the invention of a couple of Leipsic doctors, inasmuch as it was made in Germany.

The next state is the state of Michigan.

MICHIGAN

MR. C. W. CARMAN: I will take but a few moments, and you can all hear me well enough to know that I come from Michigan, but if you do not know where it is, I will tell you that the Ford Automobile is manufactured in Michigan. I do not come from a continent, but the Ford automobile goes on every continent in the world, hence I trust you will know where the state of Michigan is. I believe I am the only man from Michigan here, and I have no trouble at all in electing myself to speak to you this afternoon, as

there was no opposition. Well, Michigan manufactures more automobiles than any other state, and more furniture than any other state, as Grand Rapids is the leading furniture city of the world. The same thing may be said for lumber and a great many other things. I doubt if there is a man, hardly, in the state, who knows anything about irrigation, but I want to express the point that Michigan not only manufactures the Ford automobile, but it is still broad-minded, and although it does not need any irrigation because of its rain-fall, it is nevertheless interested in the rest of the United States and in Canada.

Many of the people in Michigan own land in the West. I have a fruit ranche in the Yakima Valley, and I am interested in the raising of fruit by irrigation. I own thousands of acres of land in Alberta, as do many other people from Michigan. I have raised in Alberta 150,000 bushels of grain in four years, within one hundred miles of Calgary, and I have raised that without irrigation, but what I want to speak about to-day is not about Michigan, because it is not an irrigation state, but the fact of what has been discussed in this whole Congress, especially to-day, and that is with reference to dry-farming and irrigation. I have watched very closely, and I have studied for the few seasons I have been in Alberta, the question of dry-farming and irrigation, and I have come to the conclusion that, while in Alberta we can raise grain and while in Alberta the mining of wheat, as it has been called, is in progress, we can raise barley and all kinds of vegetables without irrigation, and while our effort is that of some of the eastern states there is one trouble with Alberta, and that is the unexpected dry year. What we want in Alberta is a combination of dry-farming and irrigation. What we want to do, and why I wish to be able to bring people from Michigan to Alberta, is to say you can make a success. I find discouraged people in Alberta from Michigan, Why? Because such years as 1914 and 1910 happened. Your papers are advertising mixed-farming. There is just one thing that is necessary in order to have mixed-farming in Alberta, and that is a little bit of assurance in the way of water insurance. Give us a little bit, so that we can have it, and when we want it, so that we shall not have to give the stock away some years, like eastern Alberta and western Saskatchewan. I have been working for five years with the Dominion Government to let me take a little bit of water out of the Bow river to care for stock. The Dominion Government has always refused to grant that. Now, when we can have just a little flood water to bridge over the bad season, then I can bring more people from Michigan to Alberta, and the population of southern Alberta will increase and be more prosperous. (Applause.)

PRESIDENT YOUNG: The next state I call upon is Montana. This state will be represented by Mr. L. Newman, of Great Falls, whose time is limited to two and a half minutes by previous arrangement.

MONTANA

MR. L. NEWMAN: Mr. Chairman, Ladies and Gentlemen: With all due respect to my friends from the different states across the line, I insist that the great state of Montana is the best of them all.

I am not saying anything about Australia, and we can well afford to believe everything said by Australia's able representative, because we are not in competition with Australia, but we are with the Dominion of Canada. As you know, Montana joins Canada on the south, and it may be that the province of Alberta, or that portion of it that joins our state, is as good as Montana, because there is nothing but an imaginary line to distinguish one from the other. I say that Montana is the greatest state in the Union, great in area, great in opportunities for men and women. Some time ago a woman in the East asked me what were the chances for women in Montana, and I said they ought to be good, because the proportion of population was three men to one woman.

In area Montana is as large as ten of the eastern and New England States. We have 93,000,000 acres of which one-third is first-class agricultural land, one-third second-class, and one-third forest and mountain land. We Montanans ourselves hardly realized until a few years ago the value of our undeveloped resources. Ten years ago our grain yield was 3,000,000 bushels; this year it is 80,000,000 bushels. (Applause).

PRESIDENT YOUNG: Montana seems to be suffering from Australiatitis.

OREGON

MR. J. T. HINKLE: Mr. President, Ladies and Gentlemen: Oregon, as a state, has received great notoriety almost as much so as Australia, in the matter of its up-to-date and progressive laws, so called Oregon Systems, which, as most of you know, are very well known, including everything constituting the system. We send men over to Australia to pick out all the good things they have over there, and they come back and report to us, and we incorporate them into our Oregon laws. We have the Women's Pension Act. I have not heard about the Rat Law, but I venture to say that the next legislature will pass a Rat Law.

Now, Mr. President, ladies and delegates, the state of Oregon, as you may know, is considered a comparatively old

state, as compared with the western states. You may be surprised when I tell you that to-day, out of its 16,000,000 acres of tillable land, it has less than 4,000,000 acres actually tilled and occupied, and paying any considerable amount in taxes to the state. You may be surprised when I tell you that we have a rich body of arid lands of about 4,000,000 acres—more than is now included in the entire settled portion of the state, with water flowing down the mountain sides and running to waste into the ocean sufficient to reclaim all of that territory, and to make it vastly richer and more populous than can be sustained now in our rich valleys.

The great problem in the state of Oregon, as you must verily see, is to bring into usefulness some of that 12,000,000 acres of untilled and unoccupied land, and particularly those 4,000,000 acres adapted to irrigation. Now we have done something in these lines in the state of Oregon. We have taken one advance step which no other state in the union has taken. The state of Oregon, in justice to its settlers, has appropriated from the state funds the sum of \$450,000 for the purpose of rehabilitating and placing on its feet one of our failure Carey Act irrigation schemes. In justice to the settlers we have done this thing. Not only that, we have proceeded to build that project, and while the appropriation was only made at the last session of the legislature, last February a year ago, the project was completed and in operation for this season's delivery of water.

That is our great problem, and any of you people who may have anything kind to say of the state of Oregon, I hope you will say that it is, in so far as it is settled, one of the greatest states in the Union, and, when our programme is completed, it will be without question the greatest country on the face of the earth. (Applause.)

PRESIDENT YOUNG: Russia is represented here. Does the gentleman from Russia desire to respond on behalf of his great nation?

MR. DENNIS: I think, Mr. President, the Russian representative went out this afternoon with some of the engineers to inspect the headgate.

PRESIDENT YOUNG: The next call, then, is the province of Saskatchewan. I have the pleasure of introducing Mr. Flatt, of that province.

SASKATCHEWAN

MR. C. E. FLATT: Mr. President, Ladies and Gentlemen: It affords me a very great deal of pleasure to have the opportunity of speaking to you regarding the province of Saskatchewan. I might say that it would be utterly impos-

sible for me to tell you of the wonderful advantages of that province, and its potentialities as a place for production of those things which are necessary for the maintenance of the human race. I will not attempt that. Saskatchewan is already speaking for itself as our ladies do. I might say that they do not yet have a vote, as they have in Oregon, or Australia, but I will guarantee that Saskatchewan will be the first province in Canada to grant the franchise to women. (Applause.)

I wish to speak to you on the economic question, as affecting and demonstrated in the province of Saskatchewan; the great question to-day, the world over—in Europe stopped by the war—but previous to the war. In reading an international bulletin, sent from Washington, a few days ago, I found an article by an authority in Belgium as to the question of how they were going to keep people on the land in Belgium. It is a world-wide question, and there is only one answer to that question. Many answers have been given, but I want to tell you, ladies and gentlemen, that there is only one answer to this question, and that is this—make it worth while and possible for the people to live on the land in comfort, and they will go there and stay there. (Applause.)

Now then, in Saskatchewan that is our idea. We believe there that the greatest work for us, as citizens of that great province, to do is to develop the efficiency of the human element, the efficiency of man; and we have stumbled on to what, I believe, is the best solution of that difficulty, and that is two fold system of co-operation. Co-operation; first with the people, one with the other; and next, the co-operation of the people with the government. Now, to illustrate to you how that works out. It first originated—and I take very great pleasure in stating the fact that I was one of the men who stumbled on that—in a co-operative creamery, in the little village in which I live, some eleven years ago. It is impossible for me to illustrate that to you, in the time, so I want to say this, our great fundamental principle is to teach the people to help themselves. We are not taking away from the people that desirable element of individual development. We do not want the government to perform the services of paternalism.

We want to develop the most efficient class of people on the continent of America, or elsewhere. We have struck, we believe, the proper system of doing that, and that is developing the individual people of that province. To-day our grain growers practically control the marketing of all the grain in Saskatchewan. We handle all our dairy products through the same system. We have our hail insurance absolutely in the hands of the people, and with the profit accruing to us in three years, from two or three or more

sources, with the spirit which we have developed, I have not the slightest doubt but that, in a very few years, we can establish the necessary financial institutions, absolutely under our own control, to finance the whole business of the farmers of Saskatchewan. (Applause.)

PRESIDENT YOUNG: Gentlemen, I desire to introduce to you, Mr. George Albert Smith, who is entitled to stand on his own record as one of the commonest citizens of my own state, but of whom the interesting facts may be noted, that he is the son of one of the former officers, now deceased, of this Congress and a gentleman who, I believe, attended every session, except the first one, until his demise—The Hon. John Henry Smith of Salt Lake City. I have pleasure in introducing Mr. George Albert Smith, of Salt Lake City.

UTAH

MR. GEORGE ALBERT SMITH: Mr. President, Ladies and Gentlemen: I desire on behalf of the delegates of Utah, to express our deep appreciation of the kindness that has been bestowed upon us as the guests of the people of Calgary, and I desire to say also that I believe we will carry with us remembrances of this conference that will last as long as time. I represent the little state of Utah, with a population of about 400,000, which, by the way, was the first state to inaugurate irrigation. The pioneers arrived there on the 21st day of July, A. D. 1847, and that same day they planted their crop. Utah was the first state in the Union to enfranchise women, and she has continued along the progress on all lines in a way that we are pleased to acknowledge, those of us who live there. The grandfather of the President of this Congress and my own grandfather were among the first 143 men to enter as pioneers into the Salt Lake Valley, and it is a very pleasing thing to me to have the companionship of Major Young when we make our pioneer trip into the Dominion of Canada with the Irrigation Congress. (Applause.)

There have been many things said in this Convention which are interesting. There are some optimists and some pessimists. It is said that an optimist is a man that sees the doughnut and the pessimist is the man that only sees the hole. We believe in the gospel of work in Utah, not work on the lines that some people believe in, but we believe in working between meals, and in order to make a living in that country, that has had to be done. We believe that the idler should not eat the bread of the labouring man, and we believe that any institution that builds up a law for men who are idle and indifferent and shiftless is laying a foundation for the destruction of the commonwealth. We have in the state of Utah an agricultural college and

experiment station, one of the first to be undertaken, and one of the first to undertake the duty of investigation of the duty of water. In the course of fifteen years they have put an immense amount of information on the subject amongst our population, culminating in a summary by Dr. J. A. Widtsoe in his book "Principles of Irrigation Practice," which has just been published. This work is being continued on broader lines, and in addition the situation has been investigated with the result that they are now preparing for publication things which will practically revolutionize our conception of the relative injuries caused by the different forms of alkali.

Utah has ninety-nine and a half per cent of its population that can read and write. Only two of the states in the Union can exceed that. Eighty-six per cent of the State's tax revenue is expended for education. We have excellent school buildings and it will not be possible for me to tell you all the things that we have, in the short time at my disposal. Nearly all the good things that have been enumerated by the other states are enjoyed by the state of Utah. We have immense deposits of minerals and our agricultural wealth cannot very well be estimated, because we have 20,000,000 acres which have not been touched. I come from a land that believes in the Fatherhood of God and the Brotherhood of Man, in its deepest sense, and the best and most important asset that any state in the Union, and any country in the world, can have is its community of big hearted, honourable, kind men and women and its sweet and lovely children. (Applause.)

PRESIDENT YOUNG: I am led to remark that we have an expression down in the States something like this, "His name is Dennis," and it generally means a failure, no good. You seem to have a diametrically different meaning to that word in Canada.

There will be a meeting of the Executive Committee immediately after the adjournment of this meeting, which will be, incidentally, on this platform for the purpose of organizing the committees. The meeting will last, presumably, only for a very few moments and it is desired that all members shall be present.

You will remember that there is a very interesting meeting to-night. Dr. Rutherford will speak to us. He was on this morning's programme, but it was thought to be advisable to give him an opportunity of addressing the meeting to-night, as well as the other items which are on the programme. The meeting will begin sharp at eight o'clock, and you will kindly be on time, because we desire to let the choir go to a supper which has been arranged for them at ten o'clock.

The meeting stands adjourned until eight o'clock this evening.

ELEVENTH SESSION

THURSDAY, OCTOBER 8, 1914

8 o'clock p. m.

PRESIDENT YOUNG: The Meeting will kindly be in order. Mr. Dennis has several announcements to make.

Mr. J. S. DENNIS: Ladies and Gentlemen: First, there having been some question about the safety of the building owing to smoking—you will kindly note that the Board of Control have made an absolute rule that there will be no smoking in the building to-night. (Applause.) Police constables on duty will enforce this rule.

All the delegates and their friends, who are to be our guests to-morrow morning on the trip to Bassano, will kindly note that the train will leave at 9 o'clock and not 10 o'clock. I made this announcement this afternoon, but I want you to thoroughly understand it. We have had to change the hour so as to be sure to get back in time to have the delegates from the South return to Calgary in time to catch their train.

I am asked to announce that any of those delegates, who have not yet turned in their railway certificates for validation, can do so at any time to-morrow at the office of the Palliser Hotel.

Ladies and Gentlemen of the choir; a suggestion has been made by your leader that the choir should add further to their very great kindness in making this Congress a success and, as a method of marking the general success which we have met with in holding the Congress in Calgary as indicated by the large attendance which we have had each evening, that the choir should volunteer, under Mr. Weil's conductorship, to give a concert, some day next week, of the airs you have been singing as the Irrigation Congress Choir the proceeds to be devoted to patriotic purposes. (Applause.)

PRESIDENT YOUNG: At the afternoon session of this Congress there were elected; as President of the Twenty-Second International Irrigation Congress Mr. J. B. Case, of Kansas; and as the First Vice-President the Congress honoured itself by the election of Mr. J. S. Dennis; as the Second Vice-President, Mr. Richard F. Burges, of Texas; as the Third Vice-President, Mr. J. T. Hinkle, of Oregon; as the Fourth Vice-President, Mr. Kurt Grunwald, of Colorado; as the Fifth Vice-President, Mr. George Albert Smith, of Utah; and as the Secretary, Mr. Arthur Hooker, of Washington the present Secretary.

At a meeting of the Executive Committee, held immediately after this afternoon's session, the Executive Committee organized with Mr. L. Newman, of Montana, as Chairman; and with Mr. Arthur Hooker as the Executive Secretary. The Committee also selected—to act with the President of the Congress and with the Executive Chairman and with the Secretary of the Congress and with the Chairman of the Local Board hereafter to be selected—Mr. J. S. Dennis, Mr. R. Insinger, of Washington, and myself to form the Board of Governors for the next Congress.

We will now be favoured with the selections by the choir, under the directorship of Mr. Max Weil, as follows:

“O Canada”, and “The Star Spangled Banner.” (Applause.)

THE CHOIR.

“O Canada”. (Applause).

“Star Spangled Banner.” (Applause).

Introduction of

President-Elect J. B. Case

of Kansas

PRESIDENT YOUNG: It is my pleasure and honour to introduce to this assembly, and to this Congress, my distinguished successor by this day's election in the Presidency of the International Irrigation Congress, and by the way, I may state, he is the only gentleman who has ever had the distinction of being the President, both of this Congress and of the great American Congress known as the Trans-Mississippi Commercial Congress. I take pleasure in introducing to you Mr. J. B. Case of Kansas. (Applause).

PRESIDENT CASE: Mr. President, Fellow Delegates, Ladies and Gentlemen of Calgary and of the Dominion of Canada and of the United States, I desire to explain that it is not expected of me at this particular time to deliver an address. I will only take a few moments of your time and, at the session of the Congress which will be held in the United States next year, I will then deliver my address.

To be selected as the President of this great organization, at its first meeting outside of the United States, in the Dominion of Canada, is an honour that comes to but few men. I thank you for the high honour you have given me. While the President of this Congress receives the greatest publicity, and is the head of the Congress, his authority is somewhat like that of the King of England. In other words, he is surrounded

by a Board of Governors which dictate the policy of this great organization. To succeed the very able President of this session makes it somewhat of a hardship to me. I sincerely express the hope that the next session may be as successful as this one has been, and that the people of the United States may show their appreciation to the people of Canada as much as we have been appreciated here.

I take this occasion to extend an invitation to every province in the Dominion of Canada to attend the next session, bringing with them all delegates that are interested in our great work, and I would be more than pleased to have Governor Dennis bring with him the International Irrigation Congress Choir of Calgary, and our ex-President Major Young now Governor, bring with him the great Salt Lake Choir of Utah. In the meantime, I would suggest that director Newell bring with him President Wilson; also to educate the delegates of the United States to sing "The Star Spangled Banner" as well as the Canadian people sing "God Save the King."

Let me suggest to the delegates to give as much publicity as possible to the meeting of the next session; to impress upon the members of the United States Senate and Members of Congress, or as many of them as possible, to meet with us and participate in the deliberations of our Congress.

Every friend of the West is my friend. In peace, friendship and fraternity, we will co-operate with Canada in working out the splendid and alluring destiny of the West, and whenever I can serve any section of this great rich territory, that embraces the heart of the country, you are my master and I am your servant.

I trust that the highest hopes, loftiest expectations, the most enchanting dreams of this Congress may be realized in the fullest fruition of western prosperity and western development. (Applause.)

PRESIDENT YOUNG: The Chorus will now sing the national anthems of the Allies—Belgium, Russia and France, under the direction of Mr. Weil. (Applause.)

THE CHOIR:

Belgium National Anthem, "The King and Law and Liberty." (Applause.)

Russian National Anthem, "God Save the Czar." (Applause.)

French National Anthem, "La Marseillaise." (Applause.)

PRESIDENT YOUNG: Our next number is an address by Dr. J. G. Rutherford of Alberta, whom I have the pleasure of introducing to you. (Applause.)

Address by

Dr. J. G. Rutherford

**Superintendent of Agriculture and Animal Industry, Canadian
Pacific Railway Company**

Mr. Chairman, Ladies and Gentlemen:

I am afraid that the change from the entrancing music which you have just been hearing to the somewhat dry address which it is necessary for me to make will be rather hard upon you, but I cannot help that. I am a victim of misfortune myself and I want to explain a little the painful circumstances under which I come before you this evening. I was billed to speak this morning at 9.30 o'clock, and I had prepared a very careful technical address intended to interest a few early rising farmers and a few city delegates who had possibly been up all night. I was informed this morning that my address was postponed until this evening and here I find myself, a simple farmer standing up before a brilliant audience of this kind expected to entertain them, especially after such music as we have just been listening to. Well, you will just have to put up with what I have got. It is very plain and perhaps of no great interest to many of you although I trust before I finish you will be more interested in the subject than you have hitherto been.

The subject on which I wish to speak is the inter-dependence of the farm and the city. A great many people who live in the cities and who have their sources of income from the cities do not realize and have not anything like a proper grasp of the great basic fact that agriculture is the source of livelihood for practically the whole human race. Not only is it the source from which we derive the actual food that we eat in most cases but it is the source from which the money comes with which we pay for that food. We have been living for the last one hundred years in a sort of fool's paradise as far as the recognition of the proper place of agriculture in the order of things in this world is concerned.

We must remember that in point of progress in industrial development and to a large extent financial development and certainly educational development, this world is only about two hundred years old. That is perhaps an astonishing statement to make, but when you realize that one hundred years ago if a man in any part of the world wanted to communicate with another man in any other part of the world he used exactly the same means as Abraham did when he wished to communicate with Isaac from a distance. In other words he sent a messenger. There was not any other way to do it. You recollect that one hundred years ago when your grand-

parents wanted to go from one place to another on land they used the same means, only very slightly modified, as Pharoah did when he pursued the Israelites on their flight from Egypt, horses and chariots. It is only a very few years over a century that any one who wanted to read or do anything else after the sun went down which required light, used exactly the same apparatus, very little modified, as that which Noah used when it was necessary to milk the cow after dark in the ark. When you recollect that the proportion of people who could read and write in civilized countries one hundred years ago was about equal to the now very small portion of our populations in civilized countries who are illiterate, you will begin to realize that what I say is true and that as regards the points which I mentioned in the first place, this world is only about two hundred years old. Of course human nature has been the same during all the preceding centuries and since, but in these particulars the world is very young. Now what has been the result of the extraordinary development, industrial, commercial, financial which followed the introduction of steam. It has led to the gathering together of our people in great cities, first towns and then cities. It has led to an artificial condition of life and it has given birth to a generation of people who do not realize the importance of agriculture in the scheme of this world's affairs. Our young people, neither the boys nor the girls nor the young men nor the maidens understand the importance of agriculture, nor the fact that up to about one hundred years ago the man who tilled the soil was the most important man in the community, the man to whom everyone else had to look for a living.

We still require food and in the greater part, it comes from the soil. We still require money to buy our clothes and our jewelry and all the other luxuries which some of us think nowadays we cannot get along without, but we do not realize that they come out of the soil, nor the fact that if it were not for agriculture we would not have these great cities and great railways, these great manufacturing and financial concerns which appear to form our present day world.

The most important result of this neglect of agriculture, is the high cost of living. People have been neglecting the soil and particularly in this great new young western country of ours they have been building up cities and crowding into big urban communities jostling each other on the streets trading jack knives and town lots and forgetting it was necessary to make a living. I used the word make, unadvisedly. The trouble is they all want to make a living without earning it and they are going to find out in the very near future that if one is going to have a living it will be necessary to earn it. The theory that this world owes every man a living is going to be rather discredited in the comparatively near future. We

are all regretting very deeply the titanic struggle now in progress on the Continent of Europe, and we must admit the terrible evil of it, but when we look back over the history of the world, we find that always when people got foolish enough and sufficiently careless and regardless of the first principles of life, some great calamity happened to bring them to their senses and there is no question but what the terrible war now being waged in Europe will again bring to the front the primal importance of agriculture as a factor in human life. We must realize that these great countries over there, which are great producing countries, are in the throes of warfare, that the crops are not being garnered but are being wasted, that the fields are lying idle, the horses being shot down and the whole country, from an agricultural point of view, devastated, and that someone will have to feed those people. While we have been able to stand up so far under the high cost of the necessities of life and to, as it were, postpone the day of reckoning, this war is going to bring it home to us all and we are about to learn that if this world is to go on and if our countries are to prosper and develop as they should it will be necessary for us to restore agriculture to its proper position as the head and front of human life on this globe. (Applause.)

Now what are we doing in Canada in the matter of Agriculture? What are we doing in this great western country? We are accustomed to do a great deal of tall talking about our capabilities as an agricultural country. We are pleased to style ourselves the granary of the Empire, and we are promising to furnish food for the Mother Country, we are offering to supply food to all the countries of the world. What are the facts. I spent some twenty years in Manitoba and I have spent altogether some thirty years watching the growth of this western country, and it has always been a very interesting and at the same time a very painful study with me to observe the way in which so many of our western farmers, so called, carried on their affairs. It is nothing unusual to see the grain miner, the prairie exploiter taking his bread home from the baker in the town or the village, buying his potatoes from the grocer, buying his meat from the butcher, buying his condensed milk from the tin-smith (laughter). I have even seen farmers in the spring of the year going out with four or five bales of hay in a wagon in order to feed their horses through the spring work. We all laugh at farmers of that kind because we know and realize that the only man who can make a permanent success as a farmer is the man who goes out on the land to make a home for himself and his family, a man who is willing and ready to take advantage to the full of the great privilege which the farmer has over all the rest of us, namely that of obtaining so many of the necessities of life at first cost out of his own garden and off his own farm. The only

man who can succeed is the man who goes out with that intention, the man who sits down on the land and says "I am going to live here, with my wife and my children and we are going to have our garden and our chickens and our cows and pigs and we are going to do without the big grocery and butcher bills which our poor deluded fellow citizens who live in the town have to pay". The farmer who starts in on this basis is all right and he will do well on the land. He belongs to an entirely different class from those dead game sport, get-rich-quick farmers who come up here and borrow money most of them and buy a steam plow and a threshing machine and begin to turn over a few miles of prairie on the gamble that they will get a big crop and be able to go to California for the winter. (Applause.) It is thirty years since I first came and lived in this western country and for a great many of those years I made my living driving in and out of farmer's yards, and I know what happens to these sporty grain miners and I know what happens to the other fellow who sits down to first make a living for himself and his family and then to sell his surplus as it comes along. I can take you into district after district throughout this western country and I can show you in the older districts the prosperous contented farmers with their comfortable homesteads, but I cannot show you the other fellows, they are not there, they have gone. There are still a few of them in the newer parts of the country, but they do not last long, they just disappear.

Now I come back to where I was at. If we laugh at, as we do and ridicule as we do the farmer who buys his provisions in town what have we as a nation got to say about it? Canada with all her talk about her farming and her agriculture and her potentialities as regards the production of food is a very large food importing country. She imports right here in Calgary, we eat it, mutton from Australia and New Zealand. I can take you into any provision store in this city and I can show you large tins with yellow paper covers on them labelled Fray Bentos. That is beef, and good beef, packed in South America in the Argentine Republic and Uruguay and sent across to London and from there it is shipped back to Canada to Montreal in the summer time, St. John in the winter, Vancouver all the year round and it is carried over the Canadian Pacific Railway and the other railways and it is brought right up here into the beef growing country of Alberta and you and I eat it and it is good. And there are tons and tons and tons of it used in Canada every week. We bring our mutton from Australia. It started coming in at Vancouver, but a few years ago, it began coming in at St. John and now we are getting it both ways. We have only two million sheep in Canada. They have thirty-four million sheep in the little country of Great Britain and Ireland. They have thirty-

eight million sheep in the Argentine Republic and they have one hundred and ten million sheep in Australia while our neighbours to the south in the United States have over fifty million sheep and they have not enough and we in Canada have only two million sheep; on this great farm of ours, a farm in which more grass grows up every spring and withers and dies down every fall uneaten and unused, than in any other country in the world that I know anything about. (Applause) Now see where we are, mutton from Australia, beef from South America, butter from New Zealand, and eggs from China and still we take it upon ourselves to ridicule the prairie farmer because he buys his provisions in town. I heard my friend from British Columbia here, the Minister of Agriculture, say that that province sent out last year twenty million dollars for food and a great part of it was sent out of the Dominion of Canada. It is up to us to think what we are doing. When I walk up Eighth and Ninth Avenues, the leading arteries of this great big growing young city, which does not quite know what to do with itself, it is like a big overgrown baby to me, I can hardly get along the street at times for big, strong, muscular idle young fellows who are loafing around and sizing up the price of oil shares and other things; it used to be town lots. They ought to be out in the country, every one of them, with a wife and a family digging. (Applause.) They do not want to work, they want to make a living without earning it.

Now we have got to get down to business in this Canada of ours. Our governments want to wake up, our Dominion Government is waking up a little and our own Provincial Government is waking up, our friend from British Columbia here—I must say it because he is here—is waking up. They are all waking up a little, but it is not enough. We have got to teach our governments, our Prime Minister at Ottawa, and the Premiers of the various provinces that agriculture must be considered, that if we are going to develop this great Canada of ours, we must develop the agricultural end of it first. It is time enough for the manufacturer and the banker and the railroad and the insurance man and all these other magnates to get theirs after the people who produce the goods get theirs, and the farmers must have first consideration. (Applause.) We are simply playing with the question, we have not begun to deal with it in earnest. It is for the people of this great country to realize once and for all that agriculture is the main thing and that it must be developed and properly developed. We have had up till now too much exploitation masquerading as development and from this time on, we must have the real thing.

Now you might say, what has all this to do with irrigation, it has a great deal to do with it because irrigation is only one

way of bringing into use the fertility of soil which owing to climatic conditions is unavailable. Irrigation is even better than that because the results of irrigation and the work connected with it, even on the most fertile soil, are such that, in order to make remunerative the crops raised they must be valuable and that means intensive cultivation. The great curse of this country of ours and of the North American Continent generally, has been the extensive occupation of land as opposed to the intensive cultivation of it. When you go into other countries where farming has been carried on for centuries, you frequently find people making a good living out of one or two or three acres of land properly cultivated in intensive fashion. The western farmer, on the other hand, says "I cannot do anything with a half section; a half section is no use to me, I want a section," and he buys or rather goes in debt for a section where he ought to have eighty acres or a hundred and sixty at the outside. It is the same old story, easy come, easy go, they do not really want to farm, they simply want to handle a lot of machinery and go down east or to California in the winter.

Now, everything that tends to bring about an improvement of agricultural methods has my support, has always had my support. I think I am the only man who ever had the courage year after year to stand up in front of the farmers of Manitoba and Saskatchewan and tell them that a big bumper grain crop was the greatest misfortune that their country could have, and it is. Three times in my experience we got the farmers of Manitoba started into mixed farming, into the keeping of livestock. Three times we got them into the keeping of cattle, of pigs and of poultry and they were doing first rate, getting on well and laying a foundation for future prosperity when along came one of those great big bumper crops and they all went crazy again. The creameries and the cheese factories were shut up for want of patronage. The pigs were given away, not for their intrinsic value, but as tokens of respect and esteem and the poultry were allowed to freeze. Many a man hypothecated everything he had to borrow enough money to put his land into wheat. The prospect of forty bushels to the acre and a dollar a bushel was too much for their equanimity and very frequently the next year's crop would be a very meagre one and these speculators would find themselves broke and compelled to make a fresh start. We want to get our people down to the idea that they must live on and out of the land. Some good, well meaning people have been advocating lately schemes to take all the unemployed out of the cities and plant them on the land, but this is not as simple and easy as it looks. To be sure of success a man and his wife (the wife is very important) must have their minds made up that they are going out there to live, not merely

going out to wait until times are better and then get back to the movies and the electric lights. Look at the difference between the people raised in the country and those we raise in the cities and towns nowadays. Ask any man that has made good in this Canada of ours to-day, where he was raised and in nineteen cases out of twenty he will answer "on a farm". There is where folks get muscle and constitution and good habits and good modes of life, and that is where we want our girls and boys to be brought up in a natural way. The artificiality of modern life is doing infinitely more harm to our country than anything else.

Now I am afraid that this is too serious a talk for many of you here to-night, but if it is only sowing a little seed in your minds and making you think and consider this question I will not feel that the effort has been thrown away. To begin with we must have co-operation between the people in the towns and the cities and the people on the land. My friend Mr. Newman took that up this morning. He illustrated what they were doing in Great Falls, and the same thing is being done in North Battleford and Canora, Saskatchewan, and in Lethbridge, and it is now started by our Board of Trade in Calgary. We are going to co-operate with the farmer as business men because we realize that our prosperity is dependent on their prosperity and unless the farmers in the country tributary to these cities are prosperous, the cities cannot grow or even exist as they ought to exist. I do not wish to take up any more of your time. I just want to say that I am very pleased to see so many ladies in the audience, because while many of the younger men here do not realize the relation in which they stand to the opposite sex a man who has been married for thirty years has a pretty fair idea of it.

I am very glad that the ladies are out in force and that they seem to approve of the views which I have been trying to express. They wield a much greater influence in the affairs of life than the most clever and astute young man can possibly imagine. Even among older men it is astonishing how few realize how often their minds, like their meals, are made up by their wives. Without the good will of the women folk, the "Back to the Land" movement would be long delayed.

Mr. President I thank you very much for the hearing and I trust that I may have started somebody thinking by my few remarks. (Applause)

PRESIDENT YOUNG: The Chorus will now sing "Rule Britannia", "Hearts of Oak", the "Minstrel Boy", "Scots Wha' Hae", "March of the Men of Harlech". The soloists will be Miss Zelig Delsart and Mr. Horace Reynolds, and the accompanist Mr. Percy Hook.

THE CHOIR:

"Rule Britannia." (Applause.)

"Hearts of Oak," (Applause)

"The Minstrel Boy," (Applause.)

"Scots Wha' Hae." (Applause.)

"March of the Men of Harlech," (Applause.)

PRESIDENT YOUNG: The next number will be irrigation pictures, shown with stereopticon views by Mr. H. N. Savage, supervising engineer of the United States Reclamation service, after which the choir will give us further numbers which will conclude the evening's programme. First, Mr. Dennis has some announcements.

MR. DENNIS: I am asked by the Secretary of the Local Board of Control to announce that any of the delegates who desire to avail themselves of the trip to Banff will kindly hand in their names to-night at the Congress office. The return fare is \$4.40, available if any party of ten is desirous of making the trip.

There is a telegram for Mr. William Young, of Victoria, B. C., If Mr. Young is in the audience will he kindly call for the telegram at the Congress office.

I am asked by the Conductor of the choir to explain to a certain gentleman, who makes the request that the choir should sing to-night, "Its a Long Way to Tipperary", that they are not in a position to sing this for you to-night, but if you will come to the Patriotic Concert the choir volunteers to give, I am going to add to what he said, that he will sing it half a dozen times and give you a chance to join in. (Applause)

PRESIDENT YOUNG: Mr. Savage will now address us and show us his pictures. (Applause).

Address by

H. N. Savage

Supervising Engineer United States Reclamation Service

Illustrated with Stereopticon Views

This address was not reported, as the hall was in darkness.

Mr. Savage outlined briefly the purpose and policy of the United States Reclamation Service and particularly the construction work accomplished in the Northern Division where climatic and other conditions are very similar to those obtaining in southern Alberta and Saskatchewan.

The principal irrigation features of the irrigation works were described and illustrated with a number of particularly good stereopticon views.

Prominent among the features described and illustrated were the Shoshone Masonry dam in Wyoming, the highest in the world, 328. 4 feet, and the use of electrical energy in the construction of canals, and all of the structures on the Sun River Project in Montana.

Mr. Savage also described the construction of irrigation works on the several Indian Reservations in Montana, which are being carried on by the Reclamation Service for the Bureau of Indian affairs. The Indians are being taught how to work and to work, and with their teams are being employed to construct the works to irrigate the lands which have been allotted to them.

The nine principal irrigation projects of the Northern Division, of which three are on Indian Reservations, contain an estimated irrigable acreage of one million acres and for which irrigation works have been completed to cover about 250,000 acres, of which about one-half is already under irrigation. The total expenditures to date amount to about sixteen million dollars.

Mr. Savage's address and views were heartily applauded.

PRESIDENT YOUNG: The concluding exercises of this meeting, and of the Congress, will consist of the rendition of "Land of Hope and Glory," with Miss Zelig Delsart, soloist, and "God Save the King." After the close of the last selection the Congress will stand adjourned sine die, without any further remark from the Chair.

Now that we are about to adjourn this Congress sine die, I cannot refrain from saying to you what is in the minds and in the hearts of every foreign delegate, namely, we marvel at your inexhaustible resources, your material growth, your development, we are charmed with the manners of your men and of your women, we are simply overwhelmed with your kindness which has been showered upon us on every side. We are astonished at the completeness, the thoroughness of your arrangements for this Congress. We are impressed with the wisdom of your laws and with the breadth of your statesmanship. We are sensible to your artistic sense, which has manifested itself in many, many ways, in your architecture and in this superb chorus which has sung to us. We deeply sympathize with you in the fact that war clouds have lowered over the great Empire of which you are a loyal constituent. (Applause).

Gentlemen of Canada, you may congratulate yourselves that you have made possible a Congress, than which there has been no more successful Congress throughout its long and useful career, Our hearts are filled with gratitude towards you. (Applause.)

THE CHOIR:

"Land of Hope and Glory" (Applause).

"God Save The King." (Applause.)

Whereupon the Twenty-first meeting of the International Irrigation Congress stood adjourned *sine die*

EXCURSION

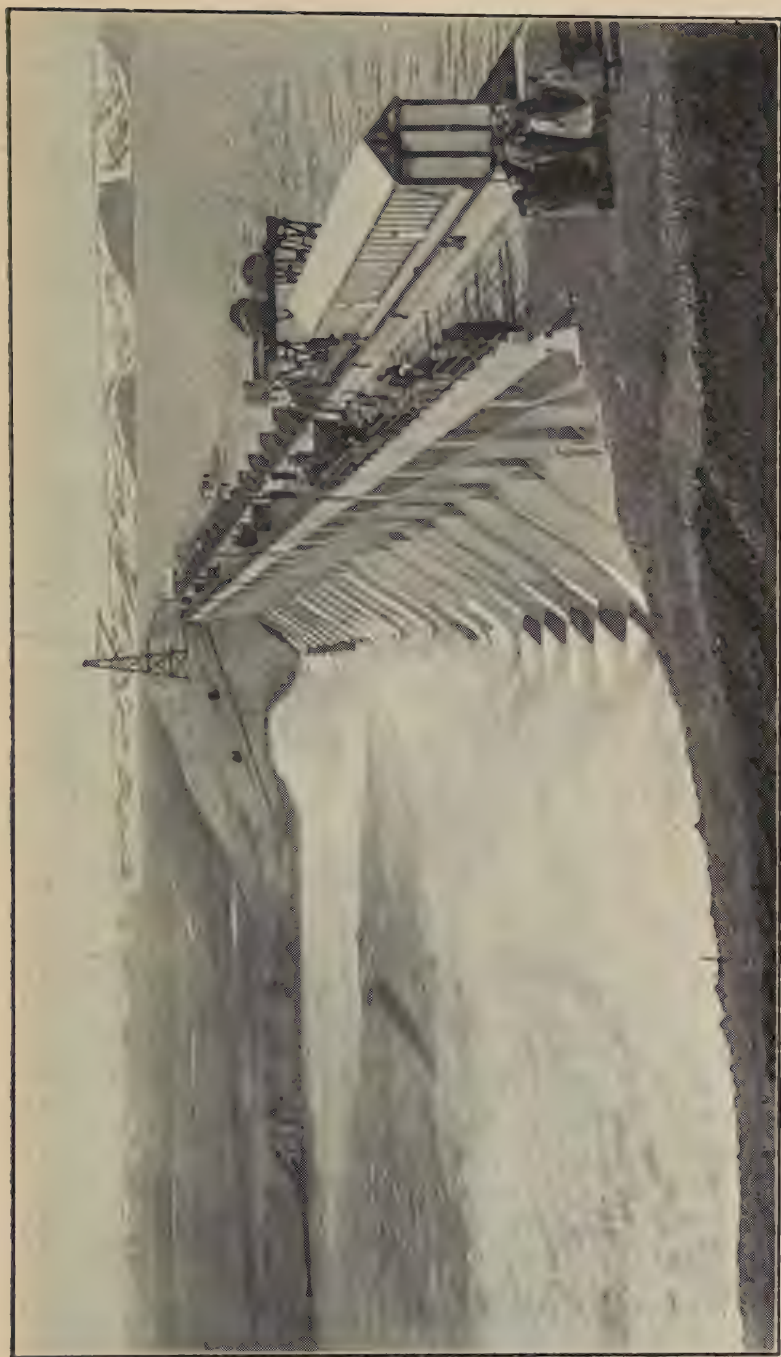
FRIDAY, OCTOBER 9, 1914

Irrigation Project Inspected

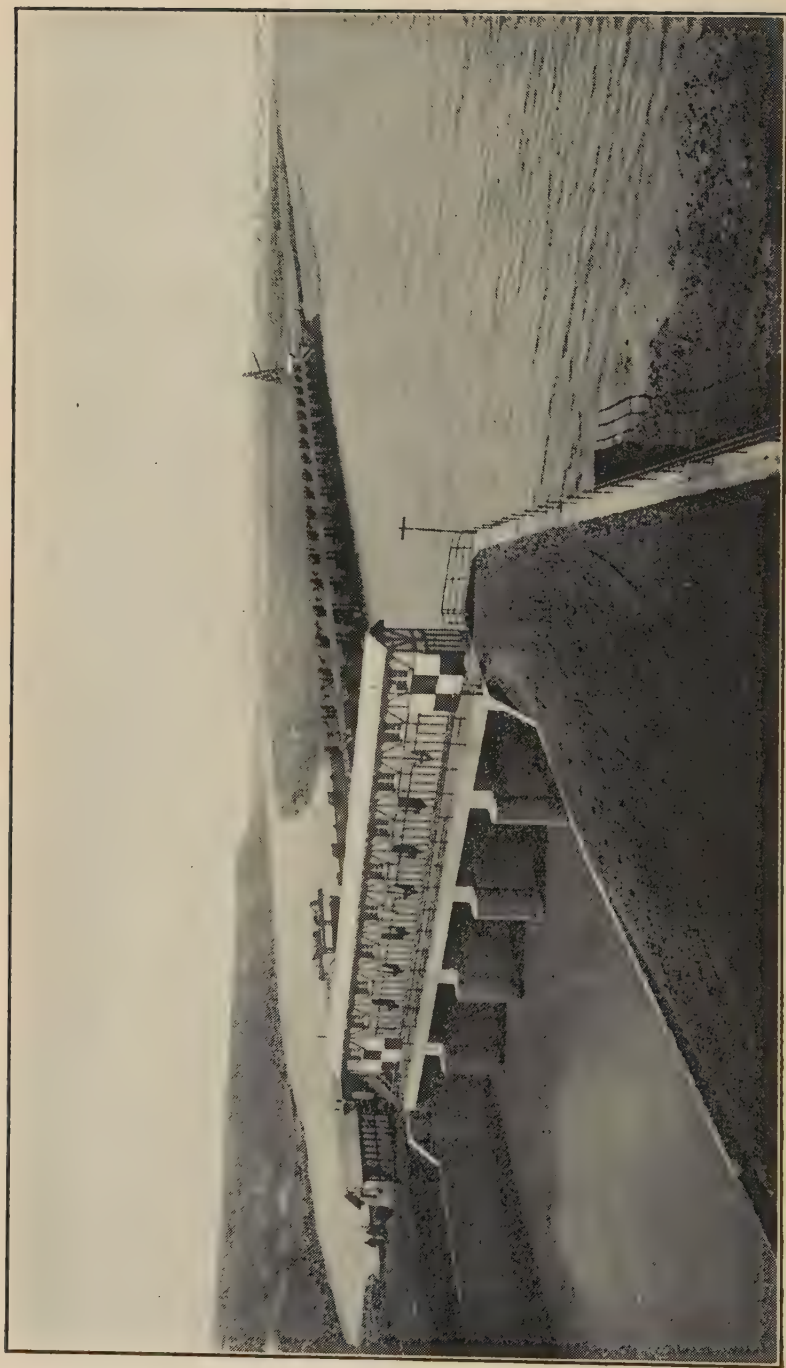
Of great interest to the delegates and visitors at the Congress was the excursion, on the last day, through the courtesy of the Canadian Pacific Railway, to its great irrigation project east of Calgary. A special train carried the party, leaving Calgary at 9 o'clock in the morning arriving, at Bassano in time for luncheon, which was furnished through the courtesy of the Board of Trade and citizens of Bassano.

Following luncheon, transportation was provided, for those who wished to visit the Horseshoe Bend Dam on the Elbow river, where the time was all too short for the inspection of this great piece of irrigation engineering. Returning to Bassano the party found their special train waiting to convey them back to the city in time for dinner.

A description of this mammoth irrigation project was given the delegates in the address of H. B. Muckleston, Assistant Chief Engineer, Department of Natural Resources, of the Canadian Pacific Railway Company, which will be found complete in the report of the meeting on Wednesday evening, October 7, to be found in this volume.



VIEW OF THE HORSESHOE BEND DAM.



VIEW OF THE HORSESHOE BEND DAM.

APPENDIX
TO THE
OFFICIAL PROCEEDINGS
OF THE
TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS

For the information of those interested in the work of the Congress, and for convenient reference, there are included in this appendix to the Official Proceedings of the International Irrigation Congress, various matters of interest in connection with the verbatim record.

Among the more important of these are: the Constitution and Rules as revised at the twenty-first meeting; the list of awards at the Soil Products Exposition, held in connection with the Congress; a list of general officers, Executive Committeemen, and Honorary Vice-Presidents of the Twenty-second Congress; the Chairman and Secretaries of state delegations of the Twenty-first Congress; and Financial statement of the Twenty-first Congress.

CONSTITUTION
OF THE
INTERNATIONAL IRRIGATION CONGRESS
REVISED AT CALGARY

ARTICLE I—NAME.

The Congress shall be known as the International Irrigation Congress.

ARTICLE II—OBJECTS

The objects of the Congress shall be (1) to promote and diffuse knowledge concerning irrigation and other uses of water, especially throughout the more arid portions of the United States; (2) to facilitate conference and deliberation among the people of the country concerning irrigation and related interests; and (3) to provide means for bringing the needs of the people and the country before state and federal governments.

ARTICLE III—MEETINGS

Section 1. Regular annual sessions shall be held at such places as the Congress shall from time to time determine and at times set by the Board of Control and approved by the Board of Governors.

Sec. 2. Special meetings of the Congress or of its officers, boards, and committees, may be held at times and places determined by the Congress or its officers.

ARTICLE IV—GENERAL OFFICERS

Section 1. The officers of the Congress shall consist of a President, five Vice-Presidents, a Secretary who may act as Treasurer, and an Assistant Secretary. These officers, with an Executive Committee, shall conduct the affairs and transact the business of the Congress.

Sec. 2. The duties of these officers may at any time be prescribed by formal action of the Congress or Executive Committee. In the absence of such action their duties shall be those implied by their designations and established by custom.

Sec. 3. The officers shall serve for one year, or until their successors are elected; provided, that the President and Secretary shall not be relieved before the close of a regular annual session except by vote of the Congress.

ARTICLE V—COMMITTEES

Section 1. There shall be an Executive Committee comprising one member from each state selected by the delegation thereof. This Executive Committee shall act for the Congress between sessions, shall have the power to initiate plans and meet emergencies, and shall report to the Congress on the opening day of each session. The President, Secretary, all Ex-Presidents and the First, Second, Third, Fourth, and Fifth Vice-Presidents of the Congress shall be ex-officio members of the Executive Committee; but the Executive Committee shall select its own Chairman and an Executive Secretary, and may appoint sub-committees and boards. The Executive Committee shall have power to fill vacancies in its own membership and among the officers of the Congress, may make its own by-laws and rules of procedure, and may maintain a permanent office, but shall not incur debts beyond available funds.

Sec. 9. The President shall be a member ex-officio of every committee of the Congress.

ARTICLE VI—ARRANGEMENTS FOR SESSIONS

Section 1. Invitations from cities desirous of entertaining the Congress at regular sessions shall be brought before the Congress for action either directly or on recommendation of the Committee on Permanent Organization.

Sec. 2. To be acceptable, invitations to the Congress from cities desirous of entertaining it must be accompanied by information as to their facilities and by a guarantee fund satisfactory to the Congress or Executive Committee.

Sec. 3. Meeting places shall be provided and hotel accommodations and other facilities arranged by the Board of Control.

Sec. 4. The programme for the session, including a list of speakers, shall be arranged by the Board of Governors, unless the preparation of the programme be entrusted by the Board to the Board of Control. The entire programme, including allotments of time to speakers and hours for daily sessions shall be referred to the Executive Committee for ratification not later than the day before the opening of each session of the Congress.

Sec. 5. Unless otherwise ordered the rules adopted for the guidance of the preceding Congress shall continue in force.

ARTICLE VII—MEMBERSHIP

Section 1. The membership of the Congress shall consist of (1) fifty delegates from each state, to be appointed by the chief executive thereof; (2) ten delegates to be appointed by each member of the highest legislative

body of any nation; (3) five delegates to be appointed by each member of the state legislature; (4) twenty-five delegates from the city in which the Congress is to meet, to be appointed by the mayor; (5) ten delegates from each city having a population of over twenty-five thousand, to be appointed by the mayor; (6) five delegates from each city and town having a population less than twenty-five thousand, to be appointed by the mayor or chief executive; (7) five delegates from each county, to be appointed by the chairman of the governing board; (8) five delegates from each commercial body and club concerned with public interests which has been duly organized not less than one year; (9) five delegates from each regularly organized association devoted to irrigation, agriculture, horticulture and engineering, from each irrigation or canal company, and from each college; (10) all duly accredited members of state and federal irrigation, water, or conservation commissions; (11) all state engineers and state commissioners of agriculture and horticulture; (12) all officers, chairmen of committees, members of the Executive Committee, Honorary Vice-Presidents, members of the Board of Control, and permanent delegates to the Congress; (13) the governor of each state, and the mayor of each city and town having a population of over one thousand; and (14) all members of the highest legislative body of any nation.

Sec. 2. Any person may become a permanent delegate, having the usual privileges accorded to delegates and none other, on payment of the sum of five dollars (\$5.00) annually, or on payment of fifty dollars (\$50.00) at one time; and the Executive Committee is empowered to recommend persons as honorary permanent delegates for distinguished services in promoting the objects of the Congress. All Ex-Presidents of the United States and of the International Irrigation Congress shall be honorary permanent delegates.

Sec. 2. A working committee of seven, to be known as the Board of Governors, including the President, the Secretary, the Chairman of the Executive Committee, the Chairman of the Board of Control, and three others to be appointed by the Executive Committee, shall be created during each regular annual session to act for the ensuing year; its membership shall be drawn from different states, and not more than one member shall be appointed from any one state. The Board of Governors shall act for the Executive Committee and may be empowered to initiate action and meet emergencies. It shall report all transactions promptly to the members of the Executive Committee, and shall submit a final report on the day before the opening of each regular annual session.

Sec. 3. A local committee, to be known as the Board of Control, shall be created in each city in which the next ensuing session of the Congress is to be held, preferably by the leading commercial bodies or business organizations; though in the absence of such local action, or in the event of failure on the part of such Board of Control to meet the financial and other requirements of the Executive Committee within sixty days after the adjournment of the preceding session, another place of meeting may be selected by the Executive Committee in lieu of that chosen by the Congress. The Board of Control shall have power to initiate action in conformity with the objects of the Congress, to raise and expend funds, to incur obligations on its own responsibility, to appoint sub-committees, and to conduct correspondence in its own name, either independently or in conjunction with the Executive Committee; and it shall report to the Executive Committee on the day before the opening of the ensuing session, and at such other times as the Congress or the Executive Committee may direct. The Secretary of the Board of Control shall, ex-officio, be Assistant Secretary of the Congress, and shall report to the Secretary.

Sec. 4. A Committee on Credentials shall be organized on the first day of each session of the Congress. It shall consist of one member from each state chosen by the delegation thereof and a temporary chairman appointed

by the President. Accepting the record of the Secretary as *prima facie* evidence of the organization of the Congress and of the rights of delegates, the Committee shall adjudicate all questions relating to credentials and delegates. It shall report to the Congress from time to time, and shall submit its final report at the earliest possible date, and in any event before the Congress proceeds to the adoption of formal resolutions, the selection of the next place of meeting, or the election of officers.

Sec. 5. A Committee on Resolutions shall be created for each session of the Congress. A temporary chairman shall be appointed by the President, one member shall be selected by each state delegation, and two members at large shall be designated by the Board of Governors with a like number by the Board of Control. The Committee shall report to the Congress not later than the morning of the last day of each session.

Sec. 6. A Committee on Permanent Organization shall be created during each session of the Congress in the manner provided for the creation of the Committee on Resolutions. It shall nominate officers for the ensuing year, may recommend to the Congress the place for the next session, and may recommend administrative policies; and it may make other recommendations looking toward the public welfare or the interest of the International Irrigation Congress.

Sec. 7. By direction of the Congress standing and special committees may be appointed by the President.

Sec. 8. No person shall act on any committee as the representative of any state who is not a bona fide resident of that state.

Sec. 9. Throughout each session of the Congress the Secretary shall keep a list of the duly accredited delegates, and shall hold the same open to examination or subject to the call of the Congress, and such list shall be subject to appeal to and action by the Credentials Committee, and in the absence of appeal or after such action and approval by the Congress, shall constitute the membership of the body for that session.

ARTICLE VIII—DELEGATIONS AND STATE OFFICERS

Section 1. The several delegates from each state in attendance at any Congress shall assemble at the earliest practicable time and organize by choosing a chairman, a secretary and a member of the Committee on Credentials; and these delegates when approved by the Committee on Credentials shall constitute the delegation from that state.

Sec. 2. On organizing or soon as may be thereafter, each state delegation will choose a member of the Committee on Resolutions and a member of the Committee on Permanent Organization to act throughout that session of the Congress, and a member of the Executive Committee for the ensuing year whose duties may begin with the close of the session; and in the absence of the member of the Executive Committee for the state at the opening of the Congress for which he was chosen, the delegation may select a substitute.

Sec. 3. In addition to the members of committees provided for herein, each state delegation may appoint an Honorary Vice-President.

ARTICLE IX—VOTING

Section 1. Each member of the Congress shall be entitled to one vote on all actions taken *viva voce*.

Sec. 2. A division may be demanded on any action by a state delegation or a ballot by an apparent majority of the delegates present; on division or ballot each member shall be entitled to one vote; provided (1), that no state shall have more than twenty votes, and provided (2), that any state having five delegates or less registered and present shall be entitled to five votes.

Sec. 3. Any state delegation may divide its vote in the ratio of duly registered delegates present at the time of voting; provided, that such division shall be stated in whole numbers.

Sec. 4. The term "state" as used herein is to be construed to mean either state, territory or insular possession of the United States or any other nation or any dependency or any province thereof.

ARTICLE X—AMENDMENTS

This Constitution may be amended by a two-thirds vote of the Congress during any regular session, provided notice of the proposed amendment has been given from the Chair not less than one day or more than two days preceding; or by unanimous vote without such notice.

RULES

FOR THE GUIDANCE OF THE TWENTY-FIRST SESSION OF THE INTERNATIONAL IRRIGATION CONGRESS

1. After the opening, each morning session shall be called to order at 9:30 a. m., and each afternoon session at 2:30 p. m. Unless otherwise ordered by vote of the Congress, evening sessions or other events shall begin at 8 p. m. Morning sessions shall adjourn at 12:30 p. m. unless otherwise ordered by vote of the Congress.

2. All sessions shall open promptly.

3. In the absence of the President at the time fixed for the opening, the duty of calling to order shall devolve on the First Vice-President, and in his absence on the Second, Third, Fourth, and Fifth Vice-Presidents, the Secretary, the Chairman of the Executive Committee, the Chairman of the Committee on Credentials, the Chairman of the Committee on Permanent Organization, and the Chairman of the Committee on Resolutions, in the order here given.

4. Any delegate or other member desiring to speak shall address the Chair, and unless called on by name shall begin by giving his name and state. Communications on subjects not entered in the programme shall be limited to three minutes unless otherwise directed by vote of the Congress.

5. General resolutions, after reading by the Secretary, shall be referred to the Committee on Resolutions without debate, and no general resolution shall be received later than Wednesday without unanimous consent. Special resolutions relating to the conduct of the Congress may be read and considered at the discretion of the presiding officer after examination by him.

6. The time of speakers in general discussion shall be limited to five minutes, and the time of speakers on questions or resolutions relating to the conduct of the Congress shall be limited to three minutes, unless otherwise directed by vote of the Congress.

7. The time of the first speaker in the programme of each daily session shall be limited to thirty minutes, and that of each other speaker on the

programme to twenty minutes; and ten minutes shall be allowed for discussion following each address.

8. For the convenience of the Congress and speakers, a gong will ring once three minutes before the close and twice at the close of the time allotted to each speaker on the programme. In the course of discussion and in addresses not entered in the programme, the gong will ring once one minute before the close and twice at the close of the time allotted to the speaker under these rules.

9. Robert's Rules of Order shall control the decisions of the Chair on all questions of parliamentary procedure.

10. Excepting the decorations provided by the Board of Control, banners shall not be displayed, nor shall printed matter be distributed or sold, in the auditorium without written authority from the Executive Committee.

11. After adoption by the Congress in open session, these rules shall remain in force throughout the Congress, but may be suspended or amended by a two-thirds vote.

SOIL PRODUCTS EXHIBITION

LIST OF AWARDS AT THE INTERNATIONAL IRRIGATION CONGRESS EXHIBITION

When it was decided that the International Irrigation Congress should meet in Calgary, the Board of Control arranged to make an exhibit of agricultural and horticultural products of the United States and Canada a distinguishing feature of the Congress. The wisdom of this decision was well exemplified in the splendid display of exhibits which were collected and admired by thousands in the Horse Show building and adjoining buildings to that in which the Congress assembled.

There were in all more than one hundred individual exhibits. The exhibits of the Natural Resources Department of the Canadian Pacific Railway, the British Columbia Government, and the Immigration Department of the Dominion Government were particularly creditable, the two former representing exhibits which had been secured and arranged at a cost of many thousands of dollars to be shown at the Panama-Pacific Exposition in San Francisco. At the close of the Irrigation Congress these exhibits were packed for shipment to San Francisco, where they will again be admired by thousands who will attend the great fair.

The exhibits shown at the International Congress were, it is officially estimated, viewed by over 20,000 people. There was an attendance of 2,500 each day for the first two days, 5,000 each day for the next two days, and 3,000 the last evening. There was also an attendance of 2,500 school children in the afternoon of the final day of the Congress, the schools of the city having been dismissed to allow the children to witness the exhibits because of their great educational value.

The Exhibits Committee, under its very energetic Chairman, Mr. E. L. Richardson, expended \$6,066.47, and paid out in prizes alone \$4,108. The judges of the exhibits were:—W. E. Scott, Deputy Minister of Agriculture of British Columbia; Mr. Kurt Grunwald, Consulting Agriculturist of Colorado; Mr. W. H. Fairfield, Manager Dominion Experimental Farm, Lethbridge, Alta.; Dr. W. J. Rutherford, Dean of the Agricultural College, Sas-

katchewan; and W. C. McKellican, Dominion Seed Branch, Brandon, Manitoba. The awards follow:—

List of Awards

	Award	Winner	Amount
<i>Display by Government or Corporation</i>		Canadian Pacific Railway Company and British Columbia Government.	
<i>District Exhibit</i>	1st.	Revelstoke Agricultural Society.....	\$500.00
	2nd	North Battleford Board of Trade....	300.00
	3rd	Kelwood, Man. (John Hamilton)....	250.00
	4th	Carstairs (Frank Peterson).....	200.00
	5th	Cardston (Arthur Perrey).....	100.00
	6th	Olds Board of Trade.....	50.00
<i>Display of Roots and Vegetables</i>	1st	Southern Alberta Land Company....	250.00
	2nd	C.P.R. Demonstration Farm.....	150.00
	3rd	F. R. E. deHart, Kelowna.....	100.00
	4th	W. E. Smith, Revelstoke.....	50.00
	5th	Robert Spenceley, Calgary.....	25.00
	6th	William Cook, Cochrane.....	15.00
	7th	T. B. Patton, Calgary.....	10.00
<i>Display of Fruit</i>	1st	Penticton Board of Trade.....	250.00
	2nd	F. R. E. deHart, Kelowna.....	150.00
	3rd	North Pacific Fruit Distributors....	100.00
<i>Display of Grain Grown in the Sheaf</i>	1st	Arthur Perrey, Cardston.....	100.00
	2nd	W. E. Smith, Revelstoke.....	50.00
	3rd	J. Cook, Cochrane.....	25.00
	4th	M. Ainslie, Irma.....	15.00
	5th	J. B. Johannsen, Standard.....	10.00
<i>Grasses</i>	1st	Arthur Perrey, Cardston.....	100.00
	2nd	W. E. Smith, Revelstoke.....	25.00
<i>Display of Alfalfa grown with Irrigation</i>	1st	Mr. Cammart, Strathmore.....	150.00
<i>Hard Spring Wheat</i>	1st	J. L. Salmon, Claresholm.....	100.00
	2nd	Percy Wheeler, Rosthern, Sask.....	40.00
	3rd	Seager Wheeler, Rosthern, Sask.....	20.00
	4th	William Hedley, Sedley, Sask.....	10.00
	5th	C. F. R. Bruce, Cluny, Alberta.....	5.00
<i>Hard Winter Wheat</i>	1st	Seager Wheeler, Rosthern.....	70.00
	2nd	J. B. Johannsen, Standard.....	30.00
	3rd	C. A. Vader, Midnapore.....	15.00
<i>Soft Winter Wheat</i>	2nd	A. M. Nisbet, Bowden.....	30.00
	3rd	Reid Bros. & Paton, Didsbury.....	15.00
<i>White Oats</i>	1st	Duncan McDonald, Eburne, B. C....	100.00
	2nd	J. G. Clark, Irma.....	40.00
	3rd	J. Cook, Cochrane.....	20.00
	4th	F. W. Burton, Strathmore.....	10.00
	5th	S. C. Hagen, Winterburn.....	5.00
<i>Six-rowed Barley.</i>	1st	John Robinson, Midnapore.....	100.00
	2nd	S. C. Hagen, Winterburn.....	40.00
	3rd	J. Cook, Cochrane.....	20.00
	4th	John Hallet Clark, Glenbow.....	10.00
	5th	Seager Wheeler, Rosthern.....	5.00

	Award	Winner	Amount
<i>Two-rowed Barley.</i>	1st	Nick Taitenger, Claresholm.....	\$70.00
	2nd	Arthur Perrey, Cardston.....	30.00
	3rd	Seager Wheeler, Rosthern.....	15.00
	4th	S. C. Hagen, Winterburn.....	10.00
<i>Peas.</i>	1st	W. R. Moir, North Battleford.....	15.00
	2nd	J. Cook Cochrane.....	10.00
<i>Flaxseed.</i>	1st	Southern Alberta Land Co.....	15.00
	2nd	S. A. Green, Moose Jaw.....	10.00
	3rd	O. A. Williamson, Pambrun.....	5.00
<i>Beans.</i>	1st	Canadian Wheatlands, Ltd.....	10.00
<i>Corn.</i>	1st	Dr. Chas. W. Dickson, Kelowna.....	10.00
	2nd	F. R. E. deHart, Kelowna.....	5.00
	3rd	H. Burtch, Kelowna.....	3.00
<i>Timothy Seed.</i>	1st	Arthur Perrey, Cardston.....	20.00
	2nd	J. H. Elliott, Irma.....	10.00
	3rd	T. H. Lee, Red Lodge.....	5.00
<i>Brome Grass.</i>	1st	Dan Patton, Midnapore.....	20.00
	2nd	Arthur Perrey, Cardston.....	10.00
	3rd	William Cook, Cochrane.....	5.00
<i>Western Rye Grass.</i>	1st	S. W. Creighton, Stalwart.....	20.00
	2nd	W. N. Crowell, Napinka.....	10.00
	3rd	Arthur Perrey, Cardston.....	5.00
<i>Alfalfa Seed.</i>	1st	Canadian Wheatlands, Limited.....	20.00
	2nd	Southern Alberta Land Co.....	10.00
	3rd	Giffen Brothers, Thompson.....	5.00

GENERAL OFFICERS

OF THE

TWENTY-SECOND INTERNATIONAL IRRIGATION CONGRESS

J. B. CASE.....	President
Abilene, Kansas	
J. S. DENNIS.....	First Vice-President
Calgary, Alberta	
RICHARD F. BURGESS.....	Second Vice-President
El Paso, Texas	
J. T. HINKLE.....	Third Vice-President
Hermiston, Oregon	
KURT GRUNWALD.....	Fourth Vice-President
Denver, Colorado	
GEO. ALBERT SMITH.....	Fifth Vice-President
Salt Lake City, Utah	
L. NEWMAN.....	Chairman Executive Committee
Great Falls, Montana	
ARTHUR HOOKER.....	Secretary
Spokane, Washington	

EXECUTIVE COMMITTEE

OF THE

TWENTY-SECOND INTERNATIONAL IRRIGATION CONGRESS

UNITED STATES

Alabama.....	Senator John Hollis Bankhead.....	Jasper
Arizona.....	Senator Henry H. Ashurst.....	Prescott
Arkansas.....	Senator J. T. Robinson.....	Tonoka
California.....	A. L. Cowell.....	San Francisco
Colorado.....	Lou D. Sweet.....	Denver
Connecticut.....	Miss Frida Sanford.....	Derby
Delaware.....	Senator H. A. DuPont.....	Winterthur
District of Columbia.....	F. H. Newell.....	Washington
Florida.....	Senator Duncan U. Fletcher.....	Jacksonville
Georgia.....	Senator A. O. Bacon.....	Macon
Idaho.....	F. E. Weymouth.....	Boise
Illinois.....	James R. Mann, M. C.....	Chicago
Indiana.....	Mrs. E. G. Andrew.....	La Porte
Iowa.....	M. F. P. Costelloe.....	Ames
Kansas.....	H. B. Walker.....	Manhattan
Kentucky.....	Senator Ollie M. James.....	Marion
Louisiana.....	W. T. Byrd.....	Baton Rouge
Maine.....	A. S. Hinds, M. C.....	Portland
Maryland.....	Senator Blair Lee.....	Silver Spring
Massachusetts.....	Augustus P. Gardner, M. C.....	Hamilton
Michigan.....	C. W. Carman.....	Grand Rapids
Minnesota.....	Senator Moses E. Clapp.....	St. Paul
Mississippi.....	Senator James K. Vardamon.....	Jackson
Missouri.....	Fred W. Fleming.....	Kansas City
Montana.....	L. Newman.....	Great Falls
Nebraska.....	Senator Geo. W. Norris.....	Mecook
Nevada.....	Senator Key Pittman.....	Tonopah
New Hampshire.....	Senator Jacob H. Gallinger.....	Concord
New Jersey.....	Senator William Hughes.....	Paterson
New Mexico.....	Col. W. S. Hopewell.....	Albuquerque
New York.....	Senator James A. O'Gorman.....	New York
North Carolina.....	Senator F. M. Simmons.....	Newbern
North Dakota.....	Senator Porter J. McCumber.....	Wahpeton
Ohio.....	E. H. Bohm.....	Cleveland
Oklahoma.....	A. C. Trumbo.....	Muskogee
Oregon.....	A. B. Thomson.....	Echo
Pennsylvania.....	Morris Knowles.....	Pittsburgh
Rhode Island.....	Senator LeBaron B. Colt.....	Bristol
South Carolina.....	Ashbury H. Lever, M. C.....	Lexington
South Dakota.....	C. L. Millet.....	Fort Pierre
Tennessee.....	Senator Luke Lee.....	Nashville
Texas.....	J. A. Smith.....	El Paso
Utah.....	Dr. E. D. Ball.....	Logan
Vermont.....	Senator Carrol S. Page.....	Hyde Park
Virginia.....	Senator Thomas S. Martin.....	Charlottesville
Washington.....	R. Insinger.....	Spokane
West Virginia.....	Senator William E. Chilton.....	Charleston
Wisconsin.....	A. J. Cobban.....	Madison
Wyoming.....	Prof. B. C. Buffum.....	Worland

DOMINION OF CANADA

Alberta.....	J. S. Dennis.....	Calgary
British Columbia.....	W. R. Austin.....	Kamloops
Manitoba.....	Prof. S. A. Bedford.....	Winnipeg
New Brunswick.....	J. B. Daggett.....	Fredericton
Nova Scotia.....	Hon. M. Cumming.....	Truro
Ontario.....	W. Bert Roadhouse.....	Toronto
Quebec.....	George A. Gigault.....	Quebec
Prince Edward Island.....	Hon. M. McKinnon.....	Charlottetown
Saskatchewan.....	W. J. Thompson.....	Saskatoon

HONORARY VICE-PRESIDENTS

OF THE

TWENTY-SECOND INTERNATIONAL IRRIGATION CONGRESS

UNITED STATES

Alabama.....	Oscar W. Underwood.....	Birmingham
Arizona.....	Gov. Geo. W. P. Hunt.....	Phoenix
California.....	Judge John Fairweather.....	Fresno
Colorado.....	Hon. Franklin E. Brooks.....	Colorado Springs
Connecticut.....	Senator Geo. P. McLean.....	Simsbury
Delaware.....	Gov. Charles R. Miller.....	Dover
District of Columbia.....	Hon. A. A. Jones.....	Washington
Florida.....	Gov. Park M. Trammell.....	Tallahassee
Georgia.....	Gov. John M. Slaton.....	Atlanta
Idaho.....	Gov. John M. Baines.....	Boise
Illinois.....	Senator James Hamilton Lewis.....	Chicago
Indiana.....	Hon. Thos. R. Marshall.....	Indianapolis
Iowa.....	Senator William S. Kenyon.....	Fort Dodge
Kansas.....	F. A. Gillespie.....	Garden City
Louisiana.....	L. L. Morgan, M. C.....	Covington
Maine.....	Senator E. C. Burleigh.....	Augusta
Maryland.....	Gov. Phillips L. Goldsborough.....	Annapolis
Michigan.....	J. Hackley Skinner.....	Grand Rapids
Minnesota.....	Senator Knute Nelson.....	Alexandria
Mississippi.....	Senator John Sharp Williams.....	Benton
Missouri.....	Hon. David R. Francis.....	St. Louis
Montana.....	Gov. S. V. Stewart.....	Helena
Nebraska.....	Senator Gilbert M. Hitchcock.....	Omaha
Nevada.....	Gov. Emmet D. Boyle.....	Carson City
New Hampshire.....	Rolland H. Spaulding.....	Concord
New Jersey.....	Senator James E. Martine.....	Plainfield
New Mexico.....	Gov. W. C. McDonald.....	Santa Fe
New York.....	Gov. Charles S. Whitman.....	Albany
North Carolina.....	Gov. Locke Craig.....	Raleigh
North Dakota.....	Gov. L. B. Hanna.....	Bismark
Ohio.....	Hon. Judson Harmon.....	Columbus
Oklahoma.....	Howard Bonebrake.....	Elreno
Oregon.....	Gov. Oswald West.....	Salem
Pennsylvania.....	Chancellor S. B. McCormick.....	Pittsburgh
Rhode Island.....	Snaetor Henry F. Lippitt.....	Providence
South Carolina.....	Senator Benjamin R. Tillman.....	Trenton
South Dakota.....	Senator Thomas Sterling.....	Huron
Tennessee.....	Gov. Thomas C. Rye.....	Nashville
Texas.....	J. C. Nagle.....	Austin
Utah.....	Dr. J. A. Widtsoe.....	Logan

Virginia.....	Gov. Henry C. Stuart.....	Richmond
Washington.....	D. M. Drumheller.....	Spokane
West Virginia.....	Gov. Henry D. Hatfield.....	Charleston
Wisconsin.....	Senator Robert M. LaFollette.....	Madison
Wyoming.....	Senator Francis E. Warren.....	Cheyenne

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Alberta.....	Hon. Duncan Marshall.....	Edmonton
British Columbia.....	Prof. Leonard S. Klinek.....	Vancouver
Manitoba.....	Hon. Geo. Lawrence.....	Winnipeg
New Brunswick.....	Hon. D. V. Landry.....	Fredericton
Ontario.....	Hon. J. S. Duff.....	Toronto
Quebec.....	Hon. Jos. Ed. Caron.....	Quebec
Saskatchewan.....	Dean W. J. Rutherford.....	Saskatoon

CHAIRMEN OF STATE DELEGATIONS

OF THE

TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS

Alberta.....	W. H. Fairfield.....	Lethbridge
British Columbia.....	Dr. Chas. W. Dickson.....	Kelowna
California.....	L. A. Nares.....	Fresno
Colorado.....	Kurt Grunwald.....	Denver
District of Columbia.....	F. H. Newell.....	Washington
Idaho.....	I. L. Flagler.....	Emmett
Kansas.....	J. B. Case.....	Abilene
Louisiana.....	W. T. Byrd.....	Baton Rouge
Michigan.....	C. W. Carman.....	Grand Rapids
Montana.....	W. A. Lamb.....	Helena
Oregon.....	J. T. Hinkle.....	Hermiston
Saskatchewan.....	R. G. Williamson.....	Maple Creek
Texas.....	John A. Happer.....	El Paso
Washington.....	E. M. Chandler.....	Burbank

SECRETARIES OF STATE DELEGATIONS

OF THE

TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS.

Alberta.....	Robert S. Stockton.....	Strathmore
British Columbia.....	C. E. Laurence.....	Kamloops
California.....	D. W. Ross.....	San Francisco
Colorado.....	Geo. M. Patterson.....	Fort Morgan
District of Columbia.....	F. H. Newell.....	Washington
Idaho.....	Mrs. E. B. Darlington.....	Hollister
Louisiana.....	W. T. Byrd.....	Baton Rouge
Michigan.....	C. W. Carman.....	Grand Rapids
Oregon.....	Mrs. A. B. Thomson.....	Echo
Saskatchewan.....	G. S. Herringer.....	Maple Creek
Texas.....	C. A. Kinne.....	El Paso
Washington.....	C. C. Thom.....	Pullman

FINANCIAL STATEMENT

OF THE

SECRETARY AND TREASURER

OF THE

TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS.

Calgary, Alberta, Canada, February 3rd, 1915.

Mr. L. Newman, Chairman Board of Governors,
Twenty-first International Irrigation Congress,
Great Falls, Montana.

Dear Sir:—

The books of the Board of Governors of the Twenty-first International Irrigation Congress show the following totals:—

CREDIT

Feb. 1, 1914 to Feb. 1, 1915.....\$7,587.11

EXPENDITURES

Feb. 1, 1914 to Feb. 1, 1915, Expenditures on Vouchers Nos. 1 to 96 inclusive	
Office Expense.....	\$1,420.74
Drayage, Freight, Packing, and Storage.....	413.71
Salaries.....	4,246.00
Travelling Expenses.....	1,140.78
	\$7,221.23

CASH ON HAND

Cash on Hand, Feb. 1, 1915.\$ 365.88

Auditor's Report of examination of accounts and vouchers in the Treasurer's office of the International Irrigation Congress, and receipts, expenditures and balances shown thereby, is appended hereto.

Respectfully submitted.

Signed), ARTHUR HOOKER.

Secretary Treasurer.

AUDITOR'S REPORT

LOUIS NEWNAM ESQ., Calgary Alberta
 Chairman, Board of Governors, Feb. 3, 1915
 International Irrigation Congress,
 Great Falls, Montana

Dear Sir:—

I, the undersigned, E. G. White, appointed to audit Mr. Hooker's accounts, by Mr. Norman C. Rankin, of the Local Board of Control and Secretary-Treasurer Hooker, in accordance with your letter to Mr. Rankin of December 9th., and the request of the Board of Governors, hereby certify that I have examined the accounts and vouchers of the Treasurer's office of the International Irrigation Congress and find them to show receipts, expenditures and balances as follows:—

CREDIT

Feb. 1, 1914	Balance in Utah State Bank, Salt Lake City, Utah.	\$ 10.11	
	Deposits in Molson's Bank, Calgary.		
Feb. 19, 1914	Account Guarantee Fund.....	2,500.00	
June 22, 1914	Balance Guarantee Fund.....	5,000.00	
Oct. 5, 1914	Official Bulletin Subscriptions.....	13.00	
Oct. 13, 1914	Official Bulletin Subscriptions.....	1.00	
Oct. 14, 1914	Official Bulletin Subscriptions.....	61.00	
Nov. 26, 1914	Official Bulletin Subscriptions.....	2.00	
			<u>\$7,587.11</u>

DEBIT

By vouchers Nos. 1 to 93 inclusive,			
Feb. 24, 1914 to Jan. 27, 1915.....	\$7571.23		
			<u>7571.23</u>
Feb. 1, 1915 Cash in Banks.....	\$15.88		
Utah State Bank.....	\$10.11		
Molson's Bank.....	5.77		
			<u>\$ 15.83</u>

Contingency Fund.

Feb. 24, 1914	Cash in Contingency Fund by Voucher No. 1.....	\$ 500.00	
	By Vouchers Nos. 94, 95, and 96, Jan. 25, 26, and 27 respectively.....	150.00	
Feb. 1, 1915	Cash in Contingency Fund.....	\$ 350.00	
			<u>\$ 350.00</u>

Expenditures.

Total Debit by Vouchers Nos. 1 to 96 inclusive....	\$7,721.23	
Less Voucher No. 1, transfer of cash from bank to Contingency Fund.....	500.00	
Total Expenditures, Feb. 24, 1914 to Feb. 1, 1915..	<u>\$7,221.23</u>	

CASH ON HAND

Feb. 1, 1915	Cash in Banks.....	\$ 15.88
	Cash in Contingency Fund.....	350.00
	Total Cash on hand, Feb. 1, 1915.....	\$ 365.88
	Total Credit.....	\$7,587.11
	Expenditures.....	7,221.23
		<u>\$ 365.88</u>

I certify that all expenditures have been made on vouchers and cheques duly approved by the Board of Governors, through their Chairman, or President, and Secretary.

Yours very truly,
(Signed) E. G. WHITE,
Auditor.

AUDIT OF BOARD OF CONTROL ACCOUNTS

Calgary, 31st. December, 1914

J. S. Dennis Esq., Chairman, Board of Control
Twenty-First International Irrigation Congress,
Calgary, Alta.

Dear Sir:—

Acting upon instructions received through your Secretary Treasurer, we have examined the Accounts of the Twenty-First International Irrigation Congress, for the period covering May 18th. 1914 to December 31st. 1914. We herewith beg to submit our report thereon, accompanied by a statement of receipts and disbursements for the period under review.

Under an agreement dated February 17th, 1914, the city of Calgary undertook to pay, at future specified times, two sums aggregating \$7500.00 to the order of the Board of Governors on behalf of the International Irrigation Congress. We are informed that \$2500.00 was advanced by the city on 19th. February 1914, against the above amount and a further sum of \$2000.00 has since been paid into the funds of the Board of Control, and we are given to understand that this constitutes the final payment from the city of Calgary. Other contributions to the funds of the Board of Control comprise the following grants:—

Canadian Pacific Railway Company.....	\$ 5000.00
The Government of the Dominion of Canada.....	5000.00
The Government of the Prov. of British Columbia.....	2500.00
The Government of the Prov. of Alberta.....	3000.00
The Government of the Prov. of Saskatchewan....	1000.00
	<u>\$16500.00</u>

and the total as shown, in addition to the aforesaid mentioned sum of \$2000.00 received from the city, accounts for the total contributions as recorded in Exhibit "A" attached hereto. All vouchers relative to the payments in the attached exhibit have been inspected by us and found in order.

At a meeting of the Executive Committee held on October 29th. 1914, it was resolved to set aside the sum of \$700.00 to meet outstanding liabilities, and we would state that this sum has been deposited to the credit of a Contingency Account in the Canadian Bank of Commerce.

All of which is respectfully submitted.

(Sgd.) WEBB, READ, HEGAN CALLINGHAM & CO.
Auditors.

EXHIBIT "A."

THE BOARD OF CONTROL.

TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS.

STATEMENT OF RECEIPTS AND DISBURSEMENTS.

May 18th, 1914 to December 31st, 1914.

RECEIPTS.

Contributions.....	\$18,500.00
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DISBURSEMENTS.

Exhibits.....	\$5,805.49
Publicity.....	2,282.13
Office Expense.....	1,192.68
Salaries.....	855.25
Entertainment.....	1,142.50
Music.....	500.00
Decorations.....	439.45
Transportation.....	72.75
Travelling Expenses.....	299.60
	<u>\$12,589.85</u>
Guarantee Funds paid to Board of Governors.....	\$7,500.00
Less paid direct by the City of Calgary.....	2,500.00
	<u>\$ 5,000.00</u>
Donation to Canadian Patriotic Fund (South Alberta Branch)....	210.15
Balance transferred to Contingencies Fund.....	700.00
	<u>\$18,500.00</u>

(Sgd.) W. R. H. C. & Co.

SUPPLEMENTAL REPORT

Calgary, 5th, February, 1915.

J. S. Dennis Esq., Chairman, Board of Control,
Twenty-First International Irrigation Congress,
Calgary, Alta.

Dear Sir:—

Supplementary to our Report of 31st. December 1914, we beg to report that we have audited the accounts of the disbursements of the Contingencies Fund of \$700.00, and that we have been furnished with proper vouchers therefor. We append statement of the disbursement of the Contingencies Fund.

Yours faithfully,
(Sgd.) WEBB, READ, HEGAN, CALLINGHAN & Co.
Chartered Accountants.
Auditors.

THE BOARD OF CONTROL.

TWENTY-FIRST INTERNATIONAL IRRIGATION CONGRESS.

STATEMENT SHOWING DISBURSEMENT OF CONTINGENCIES
FUND

AMOUNT OF FUND \$700.00

DISBURSEMENTS

Rent.....	\$ 87.50
Office Expenses.....	21.75
Salaries.....	60.00
Printing and Postage, November number Official Bulletin.....	175.25
Publicity.....	135.20
Reporting Official Proceedings.....	200.00
Exhibit Prizes.....	10.00
Balance paid Canadian Patriotic Fund.....	10.30

\$700.00

(Sgd.) W. R. H. C. & Co.

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